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Observations ON TREATMENT OF GUNSHOT WOUNDS OF THE KNEE-JOINT.

BY

CAPTAIN A. L. LOCKWOOD, R.A.M.C.(T.C.).

WHILE the saving of the man's life is the most urgent consideration, the preservation of a useful limb ensures his position as a competitive wage earner, and relieves the State of an additional burden. Successful surgery of the knee-joint demands the soundest judgement and most skilled and particular attention to detail.

Injuries to the knee-joint have always obtained the greatest respect from surgeons—in fact, have been regarded with great dread. Surgery of the knee-joint has always been, and is still, a serious and anxious undertaking, but the treatment of wounds of the joint along the lines which I am going to describe has, in very great measure, reduced our dread of knee-joint infections.

In fact, the knee-joint responds most satisfactorily when treated fairly and rationally. No longer, in these circumstances, do we have great fear of death from sepsis, amputation is rare, ankylosis has been reduced to a minimum, and a movable, useful knee is, in a great majority of cases, obtained.

GENERAL PROCEDURE.

A man comes into a base hospital with a gunshot wound of, or about, the knee-joint. Almost before his clothes are removed his dressing applied in the field ambulance or casualty clearing station is taken off, and the joint examined with the following points in mind.

1. *Date of Injury.*—Usually from two to seven days previously.

2. *The Amount of Effusion about the Joint.*—Be careful to determine whether the effusion is into the joint or not. Practically every injury which either penetrates or bruises the synovial membrane produces a blood-stained effusion into the joint.

3. *The nature of the wound*, whether a tunnelling, perforating, or an open, penetrating wound, and the exact site of the entrance and exit wound.

4. *Temperature and Pulse.*—(*a*) Usually the temperature is from 99° to 101°, with a pulse from 80 to 100; (*b*) a temperature over 101° and a pulse varying from 90 to 120 implies an already purulent condition of the joint or a virulent infection.

5. *The Condition of the Leg Above and Below the Knee.*—(*a*) Presence of wounds or foreign bodies favouring a general septic condition of the leg; (*b*) whether fracture or not, into or close to the joint.

6. *The Probable Nature of the Projectile.*—(*a*) Hand or rifle grenade fragments; (*b*) shrapnel bullets; (*c*) distorted rifle bullets or shell fragments. The difference in the infective abilities of these are not great. Jagged rough metal acts as the best carrier of infective material. (*d*) Undistorted rifle bullets. In only a small percentage of cases does one find an acutely infected joint following a rifle bullet wound, especially if early immobilization has been secured, whether a tunnelling, perforating, or more open wound, even when the bullet is retained in the joint.

7. *The amount and kind of interference* there has been with the joint since he was wounded, such as the dangerous policy of placing tubes into the joint following the track of the foreign body for transit to base.

8. *The Patient's General Condition.*—One must be guided by the patient's ability to stand a long convalescence in determining the treatment of already seriously septic joints, especially where combined with fracture of the bones.

9. *Splinting.*—If the knee is not efficiently fixed in a splint, this should be done at once. In most cases a long gutter "fracture" splint (Jones) is quite sufficient until after operation.

Having determined these factors, if there is effusion into the joint, it is at once tapped, the fluid withdrawn, and, if blood-stained or perceptibly purulent, 2 drachms of either 2 per cent. formaldehyde in glycerine (made up at least twelve hours before and not more than one week old), ether and iodoform, pure ether, or 5 per cent. saline are injected into the joint at once. A tunnelling wound produced by an undistorted rifle bullet usually requires nothing more except immobilization on a Thomas's splint. The joint must not be allowed to become tense from recurring effusion.

The fluid is sent at once for a bacteriological report from a slide and from culture.

The knee is bound on a pillow and at once screened or skiagraphed in planes at right angles to each other. The patient is returned to his ward and prepared for immediate operation if an open wound is present.

An acute infective condition of the knee-joint demanding immediate operation usually presents the following:

1. Wounded from two to five days.
2. The joint is swollen, red, and tender. The patient complains of a throbbing pain in the joint.
3. Temperature not always high, usually varying between 99° and 101°.
4. Pulse usually rapid.
5. The effusion is blood-stained in about 96 per cent. of cases, and in about 56 per cent. perceptibly purulent.

METHOD OF OPERATION.

Preparation of Case.

The skin is carefully shaved for 6 in. to 7 in. above and below the knee, cleaned with petrol or ether, and painted with iodine. Omnopon and scopolamine, one full dose,* is given one hour before operation. The patient is sent to the theatre on a splint. Open ether is administered in preference to chloroform, so as not to increase any tendency to acidosis. In some cases the operation can be done under local anaesthesia. The splint is removed, and the knee-joint supported in a partially flexed position on a sandbag. The area is again painted with iodine.

Operation.

The first step is excision *in toto* of the wound or wounds down to the capsule. Then with another knife and forceps the capsule is excised and this knife and forceps at once discarded. Absolutely no necrotic tissue must be left. Further treatment depends on the conditions found.

A Tunnelling Wound: No Fracture.

After total excision, including the wound of the capsule unless effusion is exceptionally foul, and after having carefully removed all particles of dirt, cloth, etc., the cavity is thoroughly irrigated with 1 per cent. saline until all blood clot and pus is cleared out, the leg being very gently flexed and extended at the same time. The capsule is stitched up with fine catgut, care being taken not to leave a knot of catgut inside the joint. A small tube is left down just to, but not into, the capsule, and the tissues may possibly be stitched about it with fine catgut.

The skin is approximated with silkworm gut and a mastisol and gauze dressing (two layers of gauze stretched taut) applied. The skin is cleaned up thoroughly away from the site of the wound and the joint injected as before.

It does not make much difference which preparation is injected, but I prefer either the saline or the glycerine and formaldehyde, and of the two, the latter, because:

(*a*) It is nearer the specific gravity of normal joint serum;
(*b*) It is mildly antiseptic; and
(*c*) Its mechanical oily nature seems more adaptable to a movable mechanism such as the knee-joint.

The knee is immobilized in slight flexion on a gutter splint and a Thomas's splint with slight extension. If the infection is confined to the front of the joint the extension should be omitted.

Open Penetrating Wound.

Such a wound with the foreign body still in the joint is treated in exactly the same way, except that the foreign body must be carefully localized beforehand, and removed with the minimum of trauma to the joint surfaces.

* Omnopon gr. ½, scopolamine gr. $\frac{1}{150}$.

A Wound with Localized Fracture of the Bones forming the Joint, with, possibly, the Foreign Body imbedded still in the Bone.

Such a wound is treated in exactly the same way, except that the foreign body and loose particles of bone and all soft and pulpy and possibly infected medulla must be carefully removed.

If there is much haemorrhage from the medulla, it is checked by packing the cavity with gauze wrung out of saline solution or with gauze and salt tablets.

If it involves the bone so that the capsule can be closed, this should be sutured so as to exclude the cavity in the bone from the joint. If at all possible, the synovial membrane should be closed. If it is not possible, the capsule should be carefully approximated as much as possible without tension and the wound packed with gauze and tablets, a small tube being left down just to the capsule. The plugging should be left in the bone at least five to eight days unless there are urgent reasons for removing it. The tube may be removed after two days if there is no effusion. The surface of the gauze pack and the skin around should be painted with iodine at least every second day. The superficial dressings should be changed daily at first, later only when soaked.

A Gunshot Wound of the Knee-joint where a Great Part of the Joint is Laid Open.

(*a*) If the patient's general condition will permit it at all, the wound is excised *in toto* exactly as in a small wound, irrigated, and possibly stitched up, leaving a small tube down to the capsule. It is preferable in all such cases to leave two small tubes cut as shown in Fig. 1, which, if need be, act as a two-way catheter. In such cases it is particularly important to procure absolute fixation. If this is done, and the deep packing left *in situ* till loose, it usually happens that the rest of the joint does not become seriously infected.

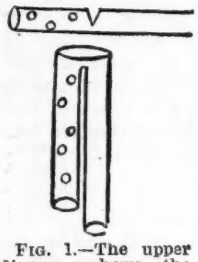


FIG. 1.—The upper diagram shows the piece of drainage tube as cut, and the lower as bent for insertion in the wound.

(*b*) If the general condition is bad, temperature high (over 102°), pulse rapid (110 or over), the face flushed and anxious, complete arthrotomy, preferably subpatellar, is performed, both lateral ligaments, ligamenta mucosa, and the crucial ligaments being also incised or cut away, and the semilunar cartilages removed.

The leg is supported, flexed to less than a right angle, on a pillow or back splint, preferably on a splint of Captain Hepburn's type, and continuous irrigation with 5 per cent. saline started at once.

Barnard's method of draining the suprapatellar pouch and the two lateral pericondylar pouches, with their diverticula posteriorly, should never be used unless modified in the following way, when it may very rightly be tried, in the type of case in which pus of a very low degree of virulence is found in the joint, accompanied with slight rise of temperature, slow pulse, and a good general condition. In such cases tubes may be placed just down to the joint, but not traversing it. Where there is a tendency for the pus to collect in the suprapatellar pouch, a small tube about the size of a lead pencil may be inserted across the pouch, but all these tubes should be removed as early as possible.

Post-operative Treatment.—Where the small tubes are left just down to the capsule, they are wiped out or aspirated daily. The skin around the tubes is wiped with saline and then with iodine. With mastisol and gauze, the dressing is very much simplified. These tubes are removed if possible within the first forty-eight hours. The plugging is left in the cavity of the bone as long as possible until loose. Usually it can be left from five to eight days, and often longer. The joint is watched carefully for increasing effusion. If it tends to increase, and the temperature and pulse start to go up—

1. The joint is aspirated with a needle, and injected as before with the glycerine-formaldehyde, ether, or saline preparations.

2. If this be not sufficient, a large needle is inserted and the whole joint washed out with saline 1 per cent. till the saline returns clear.

3. If pus still persists in forming, two large needles are inserted and saline is run continuously through the joint for from twelve to forty-eight hours, and repeated if necessary, care being taken not to admit air to the joint. The patient's general condition is carefully watched, as is also the area above and below the knee, lest pockets of pus form; support posteriorly by the "fracture" splint tends to prevent this. Especially are the popliteal space and the calf of the leg watched. Pressure on the large vessels and nerves about the knee is avoided. After arthrotomy continuous irrigation with 5 per cent. saline is used at first, then saline and glycerine dressing. The knee is closed down on a Thomas's splint with slight extension at the earliest moment, after the surfaces are covered with healthy granulation. If the component bones of the joint are badly comminuted, resection is performed, but it is not advisable to be in a hurry to do this until all signs of infection have cleared up, lest a fresh outburst be lighted up.

Amputation should be performed only as a last resort to save the life of the patient; then a quick circular operation should be done.

Sodium bicarbonate gr. xx every four hours and barley sugar *ad lib.* are given as routine where a septic condition may develop or is present.

SUMMARY.

The points on which I would lay most stress are:

1. That all foreign bodies, whether metal or loose bone, should be removed from the knee-joint at the earliest possible moment.

2. Perfect immobilization is absolutely necessary. Do not start passive movements too early; wait at least three weeks after the inflammation has subsided.

3. Absolutely complete excision of all necrotic or even oedematous tissue.

4. The capsule should be closed at the first operation if at all possible.

5. Antiseptics, other than the ones I have mentioned, should not be introduced into a joint.

6. Tubes should never traverse the joint surface as in Barnard's method.

7. Patients should not be moved till one is satisfied that infection has been successfully combated.

STATISTICS.

Space will not permit of complete tabulated statistics of all the cases treated in the last fifteen months, which I hope to publish later. I will simply give the results of 60 cases treated as described with what may be called the new method, and which remained entirely under my care until they were sent to England.

Death.

There was one death. In this case both the femur and tibia were badly comminuted, and the joint very purulent on admission. The patient was a cachectic, cadaverous-looking man, with no resistance, and he died in spite of early amputation.

Amputations.

There were three amputations. In two cases there was bad comminution of both tibia and femur, with the joint full of pus, and the general condition of the patient was not good on admission. In one case the amputation was done at once; in the other after five days in hospital. In the third case a hand grenade had absolutely shattered the joint and filled it with pieces of metal and dirt. Gas gangrene was present, and the leg was amputated at once.

Movement.

The results as to movement were as follows:

Ankylosis	3
Limited movement	4
Free movement	49

Fracture of one or both bones existed in 53 per cent., bloody effusion in 96 per cent., and pus perceptible to the naked eye in 56 per cent. of cases. The bacteriological reports on 42 cases showed that organisms were present in 76 per cent.

I wish to thank the nurses and officers that have assisted me during operations, and especially am I indebted to Colonel Gray, consulting surgeon, to whom the credit of the new method of treating gunshot wounds of the knee-joint is largely due, for his most valuable advice and assistance in these cases.

The notes of three cases of average severity with drawings made from the skiagrams are appended.

CASE I (FIGS. 2 AND 3).

Private M. Admitted June 3rd, 1915. Wounded four days before. On admission, temperature 100.1°, pulse 90. Knee-joint was very much distended with fluid, tender on pressure, and the patient complained of a continued throbbing pain through the joint. There was a jagged wound on the inner aspect of the knee-joint 2 in. above the articular surface of the internal condyle of the femur and on a plane about the middle of the condyle. On aspiration, the joint fluid was

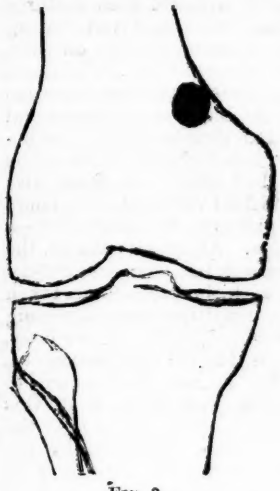


FIG. 2.

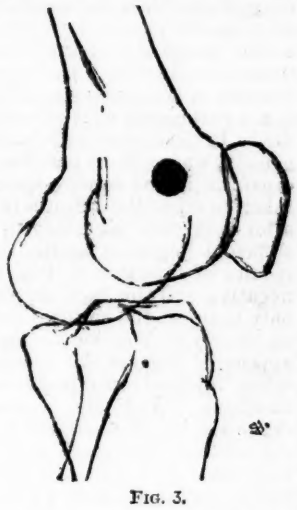


FIG. 3.

deeply blood-stained. Bacteriological report was that *B. coli* and streptococci were found.

Operation.

June 4th. Temperature 100.7°; pulse 96. The wound was widely excised in a funnel-shaped manner down to the femur. The torn capsule was excised, and particles of khaki were found along the tract, even in the cavity of the femur. The hole in the condyle (about the middle of the internal condyle) was enlarged, the shrapnel bullet (distorted) removed, and all the soft, discoloured, and affected medulla removed, leaving a cavity about the size of a walnut. A double fracture was present in the internal condyle, extending into the joint, but it was fairly solid and the periosteum was intact, so the place was left. Thoroughly irrigated the joint cavity with 5 per cent. saline, sutured up the capsule with catgut, packed the cavity of bone with gauze and salt tablets, also the excised area in the tissues. Fixed a small two-way tube down just to the capsule; injected into the joint cavity 2 drachms of formaldehyde and glycerine and immobilized the leg on a Thomas's splint with a perforated zinc back piece in slight flexion and with a little extension. Packing in bone cavity was left eleven days. The packing in the tissues was left four days without changing, and then changed about every two or three days when soaked.

On June 6th the temperature was 99°, and the pulse 90. Passive movements started on July 2nd, and two days later the patient went to England with a perfectly movable joint.

FIG. 4.

CASE II (FIG. 4).

Private T. Admitted on May 27th, 1915. Wounded five days. On admission temperature 99°, pulse 80. A jagged entrance wound just below and external to the patella. The knee-joint was very much distended with fluid, and very painful and held in partial flexion. The least movement elicited most severe pain. Bacteriologically the fluid was negative, but the effusion was deeply blood-stained.

Operation.

Local anaesthesia (novocain ½ per cent.) was used, administering only a whiff of ether when examining the articular surfaces. The wound was widely excised; the bullet carefully extracted with forceps; the joint thoroughly irrigated with 1 per cent. saline; the capsule and tissues sutured, leaving a small tube down to the capsule; 2 drachms of formaldehyde and glycerine were injected into the joint. The joint was immobilized on a Thomas's splint, with a posterior gutter splint flexed at an angle against the knee and with slight extension.

On May 29th there was very little pain, the temperature was 99° and the pulse 78.

On June 15th passive movements started, and on June 20th the case was sent to England on a posterior gutter splint.

The result was a perfectly movable knee.

CASE III (FIGS. 5 AND 6).

Private C. Admitted on June 24th, 1915. Temperature 101°, pulse 96. Two small, dirty wounds of the knee, one externally, just above the head of the fibula, and the other in the middle

FIG. 5.

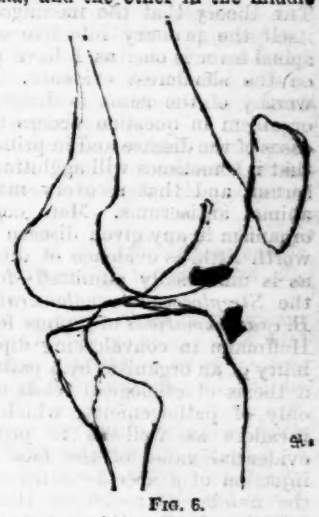


FIG. 6.

line in front, just above the tubercle of the tibia. The knee-joint was very much swollen, red, and very tender, and the patient complained of a continued throbbing pain through the joint. Bacteriological examination of the fluid showed (1) staphylococcus, (2) *B. coli*. The fluid was perceptibly purulent.

Operation.

June 25th. The temperature was 101° and the pulse 100. The wounds were excised widely. The fragments of shrapnel were carefully located and extracted with forceps. A narrow grooved fracture of the external articular surface of the tibia was present. The joint cavity was very distended with a reddish-yellow fluid.

The joint was thoroughly irrigated and the capsule stitched up. A tube was left down to the capsule externally and the tissues and skin sutured about it; 2 drachms of glycerine and formaldehyde were injected in the opposite side of the joint and the joint immobilized (with slight extension) on a Thomas's splint with a posterior gutter splint slightly flexed. The tube was removed on the second day.

On June 26th the temperature was 101° and the pulse 96, and on June 29th they were 99° and 88 respectively. Passive movements were started on July 15th, and the patient went to England on a posterior gutter splint on July 21st.

The result was a freely movable knee.

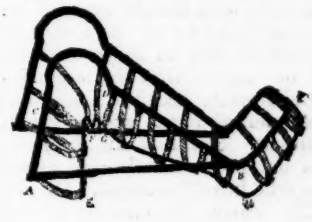
HEPBURN'S KNEE SPLINT (FIG. 7).

The black strips are of heavy aluminium splinting material, measured to approximately fit the patient's limb.

The shaded strips are of the lighter aluminium material.

The strip A B on each side is put on after the splint has been moulded to the desired angle.

An additional pair of supports applied at the joints C D will increase the rigidity.



Method of splicing D–B when long strips are not available.

FIG. 7.

A small pad is placed over the strap in the popliteal space and the splint is then padded in two sections, leaving the area of the joint freely exposed.

Pad (1) C, F, E, A, and (2) D, B, K, H, G, and cover with jaconet.

The splint is moulded to the leg and thigh, and firmly bandaged.

The foot is packed into the boot part with cotton-wool.

The patient may lie on the back or on either side, and the limb can be comfortably suspended from the point C, D, B.

This splint facilitates the care of the back and the use of the bed-pan.

The tools required to make the splint are a pair of pincers, a pair of heavy shears, and a hammer.

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BY EDWARD C. HORT, F.R.C.P.EDIN.,

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THE theory that the meningococcus of Weichselbaum is itself the primary infective agent in epidemic cerebro-spinal fever is one, as I have recently shown,[1] that rests on the slenderest evidence. Indeed, the only evidence worthy of the name is derived from the facts that the organism in question occurs in large numbers of acute cases of the disease and in primary and secondary contacts, that it sometimes will agglutinate with the human specific serum, and that recovery may follow the injection of animal antiserums. Mere constancy of presence of an organism in any given disease or in contacts is, however, worth little as evidence of direct etiological relationship, as is universally admitted—for example, in the case of the *Streptococcus conglomeratus* of scarlet fever, of the *B. exanthematicus* of typhus fever, and of the bacillus of Hoffmann in convalescing diphtheritics. And agglutinability of an organism by a patient's serum does not sustain a thesis of etiological relationship of a direct kind, but only of pathogenicity, which may apply to secondary invaders as well as to primary. And, finally, the evidential value of the fact that recovery may follow injection of a specific antiserum is gravely impaired by the number of recoveries that take place without such injection, by the absence of control injections of normal serum, and by the repeated failures of specific serums such as were experienced in the late epidemic in this country. It is true that the failure of an antimeningococcal serum may be due to lack of identity of the strain of meningococcus supposed to be causing the individual case with the strain used in the preparation of the serum. There is no question but that there are numerous strains of genuine meningococci. But until better evidence can be produced in other directions that any single strain is capable of reproducing the disease in man, multiplicity of strains offers an unsatisfactory refuge for those who uphold the etiological claims of the meningococcus of Weichselbaum. And in this connexion it is not a little surprising that the disease has not yet been recorded to have been reproduced in any animal by injection of any strain, the production of meningitis in monkeys by intraspinal injection being of course worthless as evidence that the meningococcus is the cause of a disease in which meningitis is only an inconstant event.

Critical analysis, therefore, of the evidence—bacteriological, serological, and experimental—would appear to justify the statement that the primary cause of the disease epidemic cerebro-spinal fever is still unknown, the claims of the meningococcus not having been yet made good, and no rival having been yet established. This is the conclusion I came to in previous publications on the subject, and as a result of further research since then I am more than ever convinced of the accuracy of the statement referred to.

In thus exposing, however, the fragility of the claims of the meningococcus, I was careful only to state that its case was not proven. I did not assert that the meningococcus is not the cause of the disease, because I was not then in possession of experimental data which would justify so dogmatic a statement. Still less did I assert that the meningococcus does not bear an intimate, albeit unknown, relationship to the true infective agent. On the contrary, I insisted that the search for carriers of this organism should in no wise be abandoned, since whatever its relationship to the true infective agent ultimately proved to be the fact of the frequent presence of the meningococcus in acute cases, and in primary and secondary contacts, is as yet our main guide to efforts at epidemiological control.

To-day, however, as a result of an extensive series of observations in monkeys, I am in a position to adduce experimental evidence which strongly suggests that the meningococcus is not itself the primary infective agent in epidemic cerebro-spinal fever.

This evidence is partly derived from the fact that of four monkeys injected intraperitoneally with living cultures of meningococci not a single animal appeared to be affected by the procedure. The largest counted dose given amounted to 9,200,000,000 organisms. In previously recorded animal experiments with living cultures of the meningococcus viâ other routes than the meningeal it appears that cultures on synthetic laboratory media have been employed. Owing to the possibility of rapid loss of pathogenicity on such media the absence of pathogenic response in the animals injected is not conclusive evidence that the meningococcus is not pathogenic as it occurs in the blood or cerebro-spinal fluid. In the experiments here cited, therefore, loss of pathogenicity was as far as possible excluded by cultivation of the organism in the cerebro-spinal fluid itself, care being also taken to inject the cultures in the fluid within the few hours after collection necessary to ensuring—by incubation—a sufficient degree of multiplication. As already stated, the results of injection of these four animals were completely negative, and this fact, coupled with the precautions taken only to inject the cultures under conditions approximating as closely as possible to those of cultivation in the body, appear to suggest the conclusion that the meningococcus, when injected intraperitoneally, is not pathogenic to monkeys. And the consequent deduction that this organism is not itself the primary cause in man of the disease cerebro-spinal fever is also suggested by the additional fact that intraperitoneal injection of the fresh filtrate (Chamberland F) from the cerebro-spinal fluid of two acute human cases of the disease produced in one of two further monkeys injected a continued fever lasting for several weeks, accompanied by a herpetic rash on the face, and in the second animal death forty-eight hours after injection, preceded by coma and well-marked retraction of the head. As will be seen in the protocols of the experiments here quoted, which are being published in full elsewhere,[2] conclusive evidence was not obtained that the disease had been reproduced in these two animals by injection of fresh cerebro-spinal fluid filtrate. But the results obtained were sufficiently striking to justify further experiments with fresh filtrates, and in the meanwhile to make it clear that the cerebro-spinal fluid of acute cases may contain a highly infective virus which is certainly not, in view of the first four experiments quoted, the meningococcus.

Trial was then made of the pathogenic effect in monkeys of the intraperitoneal injection of incubated filtrate (Chamberland F) of cerebro-spinal fluid, incubation being allowed to proceed for one night after filtration. A series of four monkeys were injected with incubated filtrates from four different cases, one of the animals receiving an injection of the same filtered cerebro-spinal fluid as caused before incubation continued fever in the animal referred to above. In all four animals in this series the filtrate injected was turbid with the organisms described below, but in no single case was the slightest pathogenic effect observed. These results suggest that the infectivity of freshly filtered cerebro-spinal fluid may be entirely destroyed by incubation at body temperature for a few hours, a fact which, as will be seen, may in the future prove to have a direct bearing on the question of metamorphosis, and on the problem of determining the true etiology of this disease.

The stage which we have so far reached in our inquiry may therefore be thus defined:

1. There is no good evidence that the meningococcus is the primary infective agent in the disease epidemic cerebro-spinal fever.
2. On the contrary, I have produced experimental evidence which suggests distinctly that it is not.
3. And I have also shown that the cerebro-spinal fluid of acute cases, when filtered through a Chamberland F bougie, may contain, when injected fresh, a highly infective virus.
4. This infective virus appears to be present as such only in the fresh cerebro-spinal fluid, incubation, on the other hand, appearing to destroy its infectivity.

If the meningococcus is not the primary infective agent it must, according to modern bacteriological conceptions,

* This paper is, to some extent, an abstract of a fuller paper on the same subject which will appear in the *Journal of the Royal Army Medical Corps*. For the compilation of this abstract and for the fuller paper, as well as for the filtration and animal experiments referred to, and for the hitherto unpublished experiments in typhus fever, I am alone responsible. For the strictly bacteriological observations referred to I share the responsibility with my colleagues, Dr. C. E. Lakin and Dr. T. H. C. Benians.

be either a secondary invader, or its presence must be symbiotically necessary to the true infective agent, or it must represent merely a phase in the life-history of the true infective agent. Apart from the further possibility that it may be a contaminant—a suggestion which can be summarily dismissed—it is difficult to imagine any other possible explanation of the rôle of the meningococcus of Weichselbaum. In order, therefore, to present a clear idea of the nature of the problem presented by the etiology of cerebro-spinal fever, it is necessary, before summarizing the results of our bacteriological studies up to date, briefly to discuss two of these rival theories, the third theory—that of symbiotic necessity—being merely speculative.

The Theory of Secondary Invasion.

The term "secondary invader" is one that in diseases of uncertain etiology should be applied with the greatest care, however suitable it may be in the description of such organisms as are liable to invade the blood stream in grave systemic infections primarily caused by other organisms whose etiological claims are beyond dispute. The chief characteristic of these genuine secondary invaders is their diversity in, and inconstancy to, any given disease in which they appear, as all who constantly make blood cultures will agree. In the case, however, of certain infections—such as typhus fever, scarlet fever, and, perhaps, cerebro-spinal fever, to mention only three—the essential characteristics of the so-called secondary invader in each of these diseases is not their diversity or inconstancy, but their remarkable constancy. We have, for example, constantly occurring in all parts of the world the *Bacillus exanthematicus* in typhus fever, the *Streptococcus conglomeratus* in scarlet fever, and the meningococcus of Weichselbaum in cerebro-spinal meningitis. And, be it noted, it is not only the constancy with which, in these diseases, the individual organism occurs (in the individual disease) that arrests the attention, but it is also the restriction of this organism to that disease and to no other. For example, the *Bacillus exanthematicus* of typhus fever has never been described in scarlet fever, nor the meningococcus in typhus, nor the *Streptococcus conglomeratus* in cerebro-spinal fever. None the less, the names of these organisms and of the respective diseases in which they constantly occur are as household words. It has already been insisted that mere constancy of presence of one type of organism in any given disease is not adequate evidence that such organism is itself the primary infective agent in that disease. But this constancy of presence of the so-called secondary invader in the three diseases mentioned is too striking to be a matter of accident. It is therefore not unreasonable to insist that there may be both genuine and spurious secondary invaders, and that spurious secondary invaders may prove to be modified primary invaders. The assumption that an organism is a genuine secondary invader is, in fact, in the present state of our knowledge of the etiology of certain diseases, often no more legitimate than the assumption—which we have seen in the case of the meningococcus is not justified—that it is the primary invader. Since we have not sufficiently reliable evidence that the meningococcus is either the primary invader or a genuine secondary invader, formulation of the theory that this organism merely represents a phase in the life-history of the true causal agent of the disease, at present unknown, requires no apology. On the contrary, the facts of the constancy of presence of this organism in cerebro-spinal fever and its apparent inability to reproduce the disease in monkeys, or, indeed, to exert any pathogenic effect whatever when injected by the intraperitoneal route, establish an *a priori* claim to necessity for formulation of the theory and investigation of its truth.

The Theory that the Meningococcus merely Represents a Phase in the Life-History of the Unknown Causal Agent of the Disease.

The theory—that certain bacteria may possess a more complicated life-history than their study under the artificial conditions of laboratory culture might lead one to suppose—was formulated by Hort[3] in 1914 as a result of prolonged morphological and cultural study of the infective agent in typhus fever.

That certain protistic organisms, to use Professor Herbert Henry's apt word,[4] exhibit multiple phases in the course of their development, phases essentially characterized by morphological dissimilarity, has long been known in the protozoa. And in the intermediate zone between the bacteria and the protozoa evidence is gradually accumulating that, in the case, for example, of the infective granule-shedding spirochaetes, the same principle of diversity of developmental form is at work. There is therefore nothing unreasonable in my thesis that the meningococcus, which itself appears to be relatively innocuous, represents merely a phase in the life-history of an unknown organism which is only capable of reproducing the disease in its earliest phases. And provisional acceptance of this theoretical possibility is to some extent favoured by certain considerations which have never yet been satisfactorily explained.

Here, for example, are three facts which are quite unintelligible if we accept the Teutonic concept that the meningococcus of Weichselbaum is itself the cause of the disease.

1. That the incidence of the meningococcus in carriers varies inversely as the incidence of the disease in such carriers.
2. That the organism in acute cases is a constant inhabitant—in this disease and in no other—of a fluid which, as we have shown, appears to be only infective when the presence of no meningococci can be demonstrated.
3. That a relatively large non-motile organism, such as the meningococcus, with an average diameter of about 1 micron, must be itself capable of freely traversing the meningeal filter-bed. This fact is not disposed of by the suggestion that the meningococcus is carried to the spinal canal by leucocytes, since we have no proof that this is so, and the meningococcus is frequently found to be extra-cellular in freshly drawn cerebro-spinal fluid.

If, on the other hand, the meningococcus is merely a modified primary invader, a small but dangerous ancestor of unknown morphology having been replaced by a relatively large but innocuous descendant of known morphology, all these difficulties disappear. And in the case of such carriers as do fall victims to the disease one has only to suppose that virulent ancestors and harmless descendants exist side by side.

Attractive, however, as such a theory is, and unsatisfactory as the present theory upheld by the numerous followers of Weichselbaum has proved itself to be, the onus of proof rests on those who believe that certain bacteria do in fact exhibit different morphological phases of development associated with different phases of pathogenic activity. And in this connexion it is only fair to point out that I only applied it to the study of the etiology of cerebro-spinal fever after showing that it appeared to have a strong foundation in fact in typhus fever, though I have since found additional evidence in the case of scarlet fever and in streptococcal infections associated with cardiac disease. Before, therefore, summarizing such bacteriological evidence as I and my colleagues, Dr. Lakin and Dr. Benians, have been able to collect, which would appear to justify further study of the theory as applied to cerebro-spinal fever, it is necessary briefly to recapitulate the facts which originally justified formulation of the theory in the case of typhus fever. Such digression, though not at first sight germane to discussion of the problems presented by the etiology of cerebro-spinal fever, is really necessary in order to make intelligible the general line of inquiry we have pursued in the latter disease. And the fact that some of the ensuing observations on the bacteriology of typhus fever have not yet been published seems to justify their appearance here for the same reason.

Comparison of the Problems presented by the Etiology of Typhus Fever and of Epidemic Cerebro-spinal Fever.

In typhus fever a pleomorphic organism, known as the *Bacillus exanthematicus*, can frequently be recovered from the body fluids of acute cases. In some epidemics, indeed, the organism has occurred so frequently as to suggest to many observers in the past that it was the true causal agent of the disease; and this belief was strengthened by the facts that it would often agglutinate, and even deviate

complement, in the presence of the specific human serum; that it was found in typhus fever and in no other disease, and that it was more or less pathogenic to guinea-pigs and mice. Unaccountably, however, the claims of this organism to be regarded as the primary infective agent never found general acceptance even by those who upheld the claims of the meningococcus in cerebro-spinal fever on even less satisfactory grounds. The *Bacillus exanthematicus*, in consequence, came to be looked upon as a genuine secondary invader, though no explanation was forthcoming as to why the organism occurred in typhus fever and in this disease only; and up to the year 1914 the general view of the etiology of the disease remained in this somewhat unsatisfactory condition.

In that year, however, it was shown by Hort and Ingram[5] that the *Bacillus exanthematicus* had little or no claim to being considered either the primary infective agent or a genuine secondary invader, inasmuch as they found by injection of the organism in monkeys that it was incapable of producing pathogenic effects in these animals. Their cultures were obtained by incubating human citrated blood from acute cases of the disease, the specimens of blood injected containing large numbers of the organism in question. On the other hand, injection of unincubated specimens of blood from acute cases of the disease produced in several animals the typical disease which is generally accepted as the analogue of human typhus in monkeys. They had, therefore, in this last set of experiments, an excellent control which is at present lacking in cerebro-spinal fever. For example, I recently injected intraperitoneally each of three monkeys with 6 c.cm. of a 1 in 8 suspension in citrate solution of blood taken from three acute cases of cerebro-spinal fever without provoking any material reaction, and the same negative result followed the injection of three further monkeys with the same quantities of citrated blood after incubation.

This demonstration of the total absence of recognizable pathogenic effect after injection of monkeys with the *Bacillus exanthematicus* naturally raises the question—If this organism is neither the primary invader in typhus fever nor a genuine secondary invader, what is it? To answer that it is a contaminant is no more justifiable than would be the assertion that the meningococcus of Weichselbaum is a contaminant in cultures from cases of cerebro-spinal fever. If, however, the *Bacillus exanthematicus* is itself neither the primary invader nor a genuine secondary invader, nor yet a contaminant, the problem appears insoluble. And at the time the experiments cited were undertaken no explanation suggested itself. However, after prolonged morphological study of the bacterial content of typhus body fluids in the fresh condition, supplemented by morphological study of their content after incubation, followed by plating, some interesting facts emerged which offered a reasonable solution of the mystery, though, as will be seen, absolute proof of the correctness of this solution is a matter of great technical difficulty, and has not yet been obtained.

The facts referred to were these: In many cases it was found that in the fresh fluids the pleomorphic *Bacillus exanthematicus* was present in considerable numbers, especially in the urine, side by side with very minute organisms, many of which were near the vanishing point of vision. In other cases the fresh fluids, especially the urine and the cerebro-spinal fluid, were found to contain these minute organisms in what appeared to be pure culture. On the other hand, it was found that those fluids which contained, or appeared to contain, when fresh, these minute organisms in pure culture contained after incubation only the large pleomorphic organisms. Obviously, therefore, these small organisms, the discovery of which has since been amply confirmed by W. W. C. Topley,[6] working in Serbia, had either disappeared or else had developed into the *Bacillus exanthematicus*. Attempts were therefore made to determine which was the correct explanation by filtration of the fresh fluids containing mixtures of the small and large organisms, in the hope that the small organisms would alone traverse the Berkefeld and Chamberland bougies employed. These experiments were successful to the extent that the clear filtrates on two occasions showed on centrifuging small numbers of the minute organisms alone, whilst incubation of the same filtrates produced in a few days marked turbidity due to the presence of large numbers of the *B. exanthematicus*. And pure cultures of these in some cases appeared on plating.

Unfortunately the minute organisms referred to would never survive subculture on plates beyond the first culture, so that biochemical identification was impossible. But single colonies, which appeared by film examination to be pure, on further subculture always developed the pleomorphic *Bacillus exanthematicus*. It was, however, impracticable to attempt to prove metamorphosis by growth from a single organism, either by Barber's method, or by the use of small fragments of coverslips, because in picking up—by the latter method—one minute organism near the vanishing point of vision it could not be guaranteed that another organism beyond the range of vision would not at the same time be taken up. Moreover, owing to the fact that in its earliest forms these minute organisms often appeared to have become detached from the periphery of zoogloeic masses of organisms so small as to be of quite indeterminable morphology the application of serological tests for purposes of identification with the *Bacillus exanthematicus* was also out of the question. Recourse was therefore had to injection of monkeys with pure first cultures of the minute organisms on serum-agar. The procedure was, in all the cases tested, followed by the appearance, after an incubation period of a few days, of a disease accompanied by continued fever. This disease, beyond being of a somewhat shorter duration, suggesting that full pathogenicity had been to some extent lost by artificial cultivation, had as much claim to be considered genuine typhus fever as the disease produced in monkeys by the injection of fresh human typhus blood. From two of the monkeys injected with fresh human blood minute organisms morphologically identical with the minute organisms described were again recovered, as well as the *Bacillus exanthematicus*. Two of the monkeys injected with the serum-agar cultures were—after recovery from the disease following injection—several months later injected with fresh human typhus blood, but neither animal responded, though one of the unimmunized controls exhibited a typical fever curve. These two animals were, therefore, perhaps immunized. A convenient opportunity of repeating this observation has, however, not yet occurred. A further interesting experiment bearing on the question of metamorphosis was, however, made. A series of four fresh specimens of human typhus blood collected before the crisis were injected into four healthy monkeys, and in three of the animals the so-called "typhus classique" appeared and ran its course. Another series of four specimens of human typhus blood in citrate, three of which were collected also before the crisis, was then injected into another series of four monkeys after the blood had been kept in the incubator at blood temperature for periods varying from several hours to several days, but in no case was any reaction whatever observed. It will be necessary to repeat this experiment, when opportunity allows, by injecting monkeys with samples of the same specimens of human typhus blood before and after incubation, in order to be certain that insusceptibility of the individual animal recording a negative result does not come into play. But, even as carried out, the experiment suggests that, as in the case of the cerebro-spinal fluid in cerebro-spinal fever referred to earlier in this abstract, it is only the fresh body-fluid which is infective. And in view of the other experiments referred to it is legitimate to suggest that the results of this experiment lend some support to the view that the *Bacillus exanthematicus* represents a harmless phase in the life-history of the minute pleomorphic organism described by Hort and Ingram in 1914. Before leaving the subject of typhus it is necessary briefly to refer to the *Bacillus exanthematicus* of Plötz, recent accounts of which appear at first sight to affect the validity of what has been said. The organism of Plötz, which has lately been exploited as the true primary infective agent in typhus, mainly differs from the *Bacillus exanthematicus* in the fact that it is said to be only possible to grow it anaërobically. Its claim to be the primary infective agent appears to be mainly based on the statement that it may produce fever when injected into animals, and that immunization can in this way be obtained against the fever-producing effect of injections of human typhus blood. It was with some interest, therefore, that I recently examined a heated emulsion of Plötz's *Bacillus exanthematicus*, large quantities of which have been tested as prophylactic vaccines in Serbia. The specimen received was contained in a sealed capsule, and

presumably it was looked upon as a pure culture of Plötz's Gram-positive pleomorphic organism, which is morphologically indistinguishable from a strain grown aërobically in this country. The contents of the capsule were centrifuged and a film from the deposit was stained with Gram and counterstained with dilute fuchsin. Examination of the film revealed, however, that it was not a pure culture, and that mixed with the *Bacillus exanthematicus* were considerable numbers of the minute Gram-negative organisms morphologically similar to those described by Hort and Ingram. The Gram-positive bacillus measured in its greatest diameters from 0.5 to 1.5 microns, whilst the minute organisms varied from about 0.2 to 0.6 micron, though organisms nearer to the vanishing point of vision were also seen. It is, therefore, not an unfair inference that the infectivity of Plötz's organism, and its reputed immunizing properties, on which the claims on behalf of this organism have been largely based, are in reality due to the presence of the minute cocco-bacillary organisms described, and the value of the serological reactions reported is also impaired for the same reason. Final determination of these points can, of course, only be effected by examination of living cultures, which will be carried out as soon as opportunity for so doing occurs. But, in the meanwhile, the original observations carried out by Hort and Ingram in this country hold good.

With these observations in mind as regards typhus fever, the following notes on the bacterial content of the body fluids in cases of cerebro-spinal fluid now become intelligible.

The True Bacterial Content of the Infected Body Fluids in Acute Cases of Cerebro-spinal Fever.

The necessity of determining whether the meningococcus is or is not usually the sole inhabitant of importance of the infected body fluids in cerebro-spinal fever is, of course, an essential preliminary to attempting to determine if this organism is or is not biologically related to organisms other than the meningococcus. In other words, demonstration that the body fluids in this disease are commonly sterile—apart from the meningococcus—would go far towards disproving the theory that the meningococcus represents only a phase in the life-history of the true causal organism. On the other hand, demonstration that the constantly occurring meningococcus is only one of two or more types commonly infecting the body fluids in this disease would constitute a good case for inquiry, provided that the meningococcus was itself shown to be inert—as regards reproduction of the disease—and that the fluids originally containing it were in the fresh condition possessed of pathogenic properties. And both of these provisos we have shown to be fulfilled.

Before, however, recording the results of examination of the body fluids in cerebro-spinal fever it is necessary briefly to note that in order to determine the true bacterial content of any body fluid the ordinary method of judging of sterility by recording the results of inoculating laboratory media with these fluids in the fresh state or with their centrifuged deposits is often inaccurate. For example, as has recently been shown by Hort,[7] neglect to incubate normal urine, before inoculation of the laboratory medium selected as an indicator of sterility or infection, often leads to serious fallacies. In the case of normal male urine, hitherto believed to have been proved to be sterile because in many cases no growth occurred on solid laboratory media inoculated with the fresh urine or its deposits, it was shown that if the specimens were first incubated not one out of 128 samples derived from several healthy individuals was in reality sterile. And control experiments done in parallel, in a small number of cases, completed the exposure of the fallacy involved by trusting to readings of the results obtained by inoculation of laboratory media with fresh urine. And it has since been shown by Hort and Ingram[8] that in the case of the urine of subjects of systemic infections—such as lobar pneumonia, influenza, scarlet fever, mumps, measles, cerebro-spinal fever, infective endocarditis, typhus fever—and in convalescing urinary carriers of the enteric group, as shown by Hort,[9] the same principle holds good. Similarly, in attempting to estimate the true bacterial content of the blood in any systemic infection, one is not justified in declaring the blood as sterile until examination has been made of laboratory media inoculated with incubated blood, for which purpose suspension in solution of citrate or oxalate is better than defibrination, since loss may occur by entanglement in the fibrinous mesh produced by this procedure. And in all pathological cases, whether of urine or blood, it is always advisable to examine the fluids themselves after incubation as well as the laboratory media inoculated therefrom, as it sometimes happens that organisms will grow freely in the natural medium, but will resolutely decline to adapt themselves to the alien environment of a synthetic medium, even when a liquid medium is inoculated. And, finally, by application of this principle to the cerebro-spinal fluid in acute cases of cerebro-spinal fever, my colleagues and I found, as recorded in April, 1915, that not only may the meningococcus be missed if the ordinary routine be adopted, but also that it is in many cases impossible, otherwise than by incubation, to estimate the true bacterial content of specimens of cerebro-spinal fluid in this disease as regards organisms other than the meningococcus. These results, in so far as they concern the meningococcus, have since been amply confirmed by Captain Gaskell,[10] working in Cambridge. It is, indeed, apparently the absence of this precaution of preliminary incubation which appears to be responsible for the number of specimens reported to be innocent of the meningococcus when in reality they are often not so, and, on the other hand, for the excessive attention which has in the past been paid to this organism as the reputed causal agent of the disease. In all cases, therefore, both for purposes of demonstration of the presence of the meningococcus and of determining what other organisms are likewise present in a given sample of this fluid, it is wise to make preliminary incubation a routine procedure—in parallel if desired—with the ordinary method.

Summary of Bacteriological Examination of Infected Body Fluids in Acute Cases of Cerebro-spinal Fever.

Full details of the results obtained by bacteriological examination of the specimens of infected body fluids we were able to obtain previous to April, 1915, are given in the two papers already referred to.

In the notes recorded in these papers reference is made to the examination of 10 specimens of cerebro-spinal fluid, 17 specimens of citrated blood, and 19 specimens of urine, several of which were catheter specimens.

Filtrates of these specimens were examined in five instances, the cerebro-spinal fluid supplying 1 filtrate, the blood 2 filtrates, and the urine 2 filtrates. In the case of the cerebro-spinal fluid, and in the case of one specimen of urine, two new Chamberland F bougies were employed. In the case of the two specimens of blood, and of the remaining specimen of urine, three new Berkefeld V bougies were employed. In numerous specimens of the unfiltered fluids submitted to complete examination the following organisms were described as occurring in the same specimens:

(*a*) The meningococcus of Weichselbaum.
(*b*) The meningobacillus (previously referred to by us as the "biscuit" bacillus.
(*c*) Clusters of very minute organisms, sometimes diplococcal or diplobacillary in form, at other times of quite indeterminable morphology.
(*d*) Jaeger's diplococcus.
(*e*) Involution forms, diphtheroidal forms, and large bacillary forms.

The biochemical and cultural characteristics of the meningobacillus, which ferments the same sugars as the meningococcus, and of Jaeger's diplococcus are given in full in the protocols already published. In the case of the filtrates, whether the filter employed was a Berkefeld bougie or a Chamberland bougie, the results were the same, with the exception that the organisms which morphologically resembled the meningococcus were not submitted to identification tests.

These findings, in filtered and in unfiltered body fluids from acute cases of cerebro-spinal fever, were subsequently confirmed in their morphological details by five sets of workers independently of each other and of ourselves, as judged by their published papers.[11 12 13 14 15]

From the occurrence of these several different types of organism in filtered and in unfiltered fluids, in many of

which from the application in parallel of the ordinary methods of examination without preliminary incubation the existence of pure cultures of the meningococcus was suggested, it was at first difficult to resist the conclusion that contamination must have occurred. And the presence of the involution forms, and of organisms of a diphtheroidal form, made this conclusion doubly difficult to resist. Increasing experience, however, of the value of preliminary incubation of the body fluids in cerebro-spinal fever before inoculation of laboratory media—in attempting to determine their true bacterial content—soon enabled us to refute the frequently made suggestion of contamination as being merely the outcome of inexperience of the method. And this conviction was greatly strengthened by finding that the same types of organisms simultaneously occurred again and again in increasing numbers of cases, and this largely irrespective of whether the fluid examined was cerebro-spinal fluid, blood, or urine. Moreover, the apparent existence of pleomorphism, although, as we have said, not absolutely proved by culture from single individuals, showed itself so constantly in subculturing from single colonies as practically to exclude the possibility of perpetually recurring contamination with the same organisms.

And, finally, the suggestion of contamination we have again found to be quite inadequate to explain the results obtained by repeating the observations with a fresh series of 18 specimens of cerebro-spinal fluid in the summer of 1915. Of these 18 specimens 6 were submitted to filtration, a new Chamberland bougie being in each case employed, and in the majority of the specimens, filtered and unfiltered, submitted to complete examination the same essential results were obtained, and may be seen by reference to the full paper now in the press. The total number of specimens examined amounts, therefore, to 64, of which 11 were filtrates, a Chamberland F filter being employed in 8.

The stage, therefore, we have now reached is this—that the true bacterial content of the body fluids in this disease is by no means adequately represented by the meningococcus. On the contrary—provided that these fluids are thoroughly examined by (1) study of the morphology of their deposits in fresh and in incubated specimens, both filtered and unfiltered; (2) supplemented, after plating, by cultural and biochemical study in, or on, laboratory media inoculated with incubated material, filtered and unfiltered; (3) injection of monkeys with the fresh filtrates—ample justification will be found for directly attacking the problem of the true ancestry of the meningococcus. And I therefore propose to make this the next stage in the investigation of the etiology of the disease side by side with further experimental observations in monkeys.

Conclusions.

1. There is at present available no adequate evidence to show that the meningococcus of Weichselbaum is itself the causal agent of the disease cerebro-spinal fever.

2. On the contrary, the experimental evidence here recorded distinctly suggests that it is not.

3. The fresh filtrate of cerebro-spinal fluid in the two cases examined contained a virus which was highly infective to monkeys.

4. The true bacterial content of the body fluids in this disease can only, as a routine procedure, be satisfactorily determined by, in the first instance, using the fluids themselves as the optimum medium of growth, combined with injection into suitable animals in the fresh condition.

5. Incubation of the body fluids, infective to monkeys in the unincubated state, appears to destroy their infectivity and, in so doing, to throw some light on the ancestry of the meningococcus.

Influence of Conclusions on Therapeutic and Epidemiological Control of the Disease.

1. Although the meningococcus appears itself to be incapable of reproducing the disease, the search for and isolation of carriers of this organism should, for the present, be vigorously pursued as heretofore, since its presence is a valuable danger signal that the true infective agent is, or has been, present.

2. Attempts to prepare antiserums to the meningococcus, whether multiple strains are used or not, do not appear likely to lead to effective therapeutic control of the disease.

3. Confirmation of the infectivity of fresh cerebro-spinal fluid would justify the preparation and trial of effective antiserums thereto in the treatment of the disease.

4. Attempts to destroy the meningococcus in the naso-pharynx of contact carriers, as a means of epidemiological control, would appear to be less valuable than an attempt to determine what the true infective agent of the disease really is.

5. In order to discover the true infective agent, whether biologically related to the meningococcus or not, further research is imperative, attention being particularly directed to filtrable organisms in the naso-pharynx and the cerebro-spinal fluid of acute cases.

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STUDIES IN ANTISEPTICS (II):

ON CHLORAMINE: ITS PREPARATION, PROPERTIES, AND USE.[*]

BY

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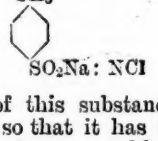
REFERENCE was made in a paper on the use of certain antiseptic substances for the treatment of infected wounds, recently published in this JOURNAL,[1] to a number of compounds containing chlorine linked to nitrogen and possessing strong germicidal properties. Substances containing this type of linkage were studied because analogous compounds were believed to be formed by the action of the actively germicidal hypochlorites upon proteins and some other nitrogenous cell constituents. After studying a very large number of substances of the type referred to, a selection has been made of the one which on the whole seemed to possess the greatest number of desirable properties and which experience showed to be practically useful. The substance chosen is para-toluene-sodium-sulphochloramide, and possesses the following structure:



The systematic name of this substance is somewhat unsuitable for general use, so that it has been decided to assign the more convenient name "chloramine" to the compound, thus indicating its membership in the group of substances containing the NCl linking. If, in future, other members of the group should come into use, it is suggested that the present compound should be known as chloramine-T to indicate its relationship with toluene.

Properties.

Chloramine, the preparation of which is described in a later section of this paper, is a white solid, crystallizing in prisms containing three molecules of water of crystallization. The solid has a very faint chlorous odour, while solutions of it are without smell. It is freely soluble in water, a saturated solution at room temperature containing

[*] This investigation was carried out on behalf and with the support of the Medical Research Committee.

about 15 per cent. of the salt. It may be dissolved in two parts of boiling water. The aqueous solution reacts faintly alkaline and has a bitter taste. It is an extremely stable substance, and in solid form may be preserved indefinitely, while aqueous solutions show no significant decomposition after keeping for several months.

Chloramine has no corrosive action even in concentrated solutions. It neither precipitates nor coagulates proteins such as blood serum, a property which is of great practical importance in the treatment of infected wounds. Chloramine is practically non-toxic, guinea-pigs and rabbits tolerating as much as 1 gram per kilo given subcutaneously, with no symptoms other than a moderate local reaction due to the injection of a strong solution.

The germicidal action of chloramine is intense, and when tested against the ordinary organisms found in infected wounds it is found to be about as powerful as an equal weight of sodium hypochlorite. The molecular weight of chloramine is about four times that of sodium hypochlorite, so that the germicidal action of one molecule of chloramine is about four times as great as that of a molecule of sodium hypochlorite. In addition, it is much less irritating than the latter substance, and may be used safely at a concentration five to ten times as great.

Table showing the Germicidal Action of Chloramine on Several Common Organisms.

Two drops of a fresh culture of the organisms were suspended in 5 c.cm. of fluid, either water or 50 per cent. horse serum, and the antiseptic was allowed to act two hours at room temperature. In comparison, a few figures for sodium hypochlorite and phenol are added.

	Chloramine.	Sodium Hypochlorite.	Phenol.
Staphylococci in water ...	1 : 500,000 − 1 : 1,000 000 +	1 : 500,000 − 1 : 1,000,000 +	1 : 250 − 1 : 500 +
Staphylococci in serum ...	1 : 1,500 − 1 : 2,500 +	1 : 1,500 − 1 : 2,000 +	1 : 50 − 1 : 100 +
B. pyocyaneus in water ...	1 : 200,000 − 1 : 400,000 +	1 : 100,000 − 1 : 1,000,000 +	1 : 200 − 1 : 400 +
B. pyocyaneus in serum ...	1 : 1,250 − 1 : 2,000 +	1 : 2,500 − 1 : 5,000 +	1 : 25 − 1 : 50 +
Streptococci in water ... Streptococci in serum ...	1 : 1,000,000 − 1 : 2,500 − 1 : 5,000 +		
B. capsulatus in water ... *B. capsulatus* in serum ...	1 : 10,000,000 − 1 : 2,500 − 1 : 5,000 +		

Complete sterilization is indicated by −, while + indicates that organisms survived.

Practical Uses.

Chloramine has already been used as an antiseptic for a variety of purposes with decidedly satisfactory results. It is not proposed at the moment to do more than outline some of its applications, leaving the detailed records of clinical results to others.

First of all a series of fresh but badly infected shell wounds containing dirt, clothing, and shell fragments were studied. The wounds were exposed, cleaned mechanically in the usual fashion, and lightly packed with gauze, leaving a narrow rubber tube or tubes passing to the bottom or recesses of the wounds. By means of these tubes 10 to 15 c.cm. of a 3 to 4 per cent. solution of chloramine was squirted at frequent intervals into the wounds by means of a glass syringe so as to moisten the whole surface of the cavity. The results were clinically similar to those observed in the early treatment of infected wounds with sodium hypochlorite,[2] with the exception that sloughs are dissolved somewhat more rapidly by the hypochlorite than by the chloramine. The majority of these wounds, though undoubtedly infected at the start, could be rendered aseptic after three to five days when treatment was commenced early. The wounds so treated were severe cases, including a number of fractures of the femur and humerus.

But the properties of chloramine seemed to indicate that it might find a more valuable application in cases where the more generally used antiseptics were either too irritating or too feeble. Accordingly it was used in a large number of cases of jaw and mouth injuries which are so apt to become extremely foul. Chloramine was used in 1 to 2 per cent. solution as a mouth wash, and a 2 per cent. solution was also squirted into the external wound cavities through short rubber tubes lightly surrounded by gauze packing. The results were very encouraging. Some of these cases have been described by Surgeon Fisher, R.N., of H.M.H.S. *Rewa*, in a recent issue of this JOURNAL. As an antiseptic mouth wash 1 to 2 per cent. chloramine has been found to be of value in a variety of septic mouth cases.

In addition chloramine at 0.5 per cent. has been used for the irrigation of bladder and uterus in septic cases and the results are stated to be encouraging. A few cases of chronic urethral infections which had been unsuccessfully treated with silver preparations did well with injections of 1 to 2 oz. of chloramine four times daily, beginning at 0.5 per cent. strength and then increasing later to 1.5 to 2 per cent.

A practical point which may prove to be of value is the fact that gauze may be readily impregnated with large quantities of chloramine. It is possible, for example, to get as much as 10 grams of chloramine in a four-fold roll of gauze 1 yard by 4 in. The use of this impregnated gauze for packing infected wounds is being investigated at the present time by Sir Berkeley Moynihan. There are very few substances of high antiseptic value which can be successfully used for impregnating gauze. Chloramine gauze obviously should not be moistened before use or the antiseptic will dissolve out. It can be used dry for lightly packing and subsequently moistened if necessary when in position.

Preparation and Cost.

Toluene-sodium-sulphochloramide (chloramine) was first prepared by Chattaway[3] by the action of sodium hydroxide upon toluene sulpho-dichloramide, a substance obtained by the action of acetic acid on toluene sulphonamide dissolved in bleaching powder solution. A more economical method for its preparation consists in dissolving p-toluene sulphonamide (1 mol.) in a 5 per cent. cold alkaline solution of sodium hypochlorite (1.2 mol.), warming gently if necessary, filtering, and adding 1½ volumes of saturated brine. The chloramine crystallizes out of solution as a white shining meal of crystals, and is filtered off, washed with brine, and dried in the air.

The toluene sulphonamide necessary for the preparation is prepared by acting upon para-toluene sulphonic chloride with ammonium carbonate. The sulphonic chloride is a by-product in the manufacture of saccharin, and in ordinary times can be obtained very cheaply. But even when made directly from toluene, the finished chloramine should be a relatively cheap antiseptic, especially when its high germicidal action is considered. The cost of a 2 to 3 per cent. solution such as is commonly used should be considerably less than that of 10 volume hydrogen peroxide. It is anticipated that the manufacture of the substance on a commercial scale will be undertaken shortly by some British firm.

Mode of Action.

In its chemical and biological reactions chloramine closely resembles the hypochlorites in many respects. Its antiseptic action, while largely due to its contained chlorine, is not simply due to the liberation of sodium hypochlorite from the chloramine, for its antiseptic action is four times as great as that of the hypochlorite which could be obtained from it. It is believed that the antiseptic action of hypochlorites is due to their capacity for attacking proteins and related bodies, with formation of substances containing chlorine linked to nitrogen. Chloramine itself appears to act in the same way, for when brought into contact with proteins, such as blood serum, or with peptones or amino-acids, it parts with its chlorine, which attaches itself to the nitrogen of the second substance. With the simplest amino-acid, glycocine, the reaction can be represented as follows:

$$CH_3.C_6H_4.SO_2Na:NCl + CH_2(NH_2).COOH = CH_2(NHCl)COONa + CH_3.C_6H_4.SO_2NH_2.$$

In this particular case the chloramino-acetic acid formed is unstable, and breaks up to give formaldehyde and other products.

Practically, the matter may be stated as follows: Chloramine represents an active antiseptic containing a store of chemically combined chlorine in a form which is quite stable and non-irritating under ordinary circumstances. But when brought in contact with proteins and similar cell constituents containing basic (NH_2) groups, it acts as a chlorinating agent losing its chlorine to the basic

substances, and thereby exerting its antiseptic action as needed.

Chloramine, being a highly reactive substance, should not be mixed with other antiseptics. Both alcohol and hydrogen peroxide are decomposed by it.

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GASSING ACCIDENTS FROM THE FUMES OF EXPLOSIVES.*

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CASES of gas poisoning account every year for a good many deaths in the mines of the Rand, and for a considerably larger number of cases of temporary disablement and loss of working time.

The irritant acid fumes, commonly known as nitrous fumes, consist of a mixture of oxides of nitrogen. They belong to the group of respiratory irritant poisons in which chlorine, the vapours of bromine and ammonia, sulphuretted hydrogen and sulphurous acid, are also included. All of these cause, when inhaled, a somewhat similar train of symptoms. Fatal poisoning by nitrous fumes has occurred when persons have inhaled the acid fumes from a vessel containing nitric acid, which has been accidentally broken. In mines, poisoning from this source only occurs after the use of explosives in cases where the detonation has been imperfect, and particularly where burning of explosives has taken place. Nitric oxide (NO) is first formed, but this gas is rapidly oxidized, and nitrous fumes consist chiefly of nitrogen peroxide[1] (NO_2). This again quickly reacts with water vapour to form nitrous acid. What is actually inhaled is mainly a mixture of nitrous and nitric acids. Nitrous fumes are the red irritant fumes with the smell of which most miners are familiar. The smell is that of fuming nitric acid. The gas is intensely poisonous, and of all mine gases it is the most treacherous. We do not know the downward limit of its toxicity. Exposure to as little as 0.05 per cent. of nitric oxide for half an hour was found by Haldane to cause death in mice after about twenty-four hours, with the typical sequence of symptoms, and the symptoms were the same whether nitric oxide or the fumes of burning dynamite were added to the air. It was found that with small percentages of nitrous fumes the haemoglobin was normal at the time of death. With higher percentages (and more rapid death) the blood was found to be more or less chocolate coloured, and to contain methaemoglobin. Under the latter circumstances nitrous fumes act like carbon monoxide by disabling the haemoglobin, and may in concentration produce rapid death. Where the exposure is to small amounts death is due solely to the lung inflammation and its immediate consequences.[2] It is with this latter form of poisoning that we are locally familiar. Half of the amount mentioned is the highest figure (0.026 per cent. reckoned as NO_2) found by Mann in mine air after blasting,[3] but the presence of the gas in poisonous amounts is probably not so very uncommon in ordinary blasting practice. I shall give some evidence for this statement later. What is certain is that quite a brief exposure to small quantities of nitrous fumes is sufficient to produce serious and even fatal poisoning. Air which contains enough nitrous fumes to cause feelings of irritation in the nose or air passages is very dangerous.

Dr. D. Macaulay was the first to direct attention to the important part played by nitrous fumes poisoning in gassing accidents on the Rand, and to give an adequate account of its symptoms and treatment.[4]

SYMPTOMS.

The symptoms of poisoning by nitrous fumes are very characteristic. At the moment of exposure they are slight. A man who inhales nitrous fumes has a sense of irritation in the nose and throat, and of constriction, and perhaps pain, in the chest. There is headache, smarting of the eyes, and there is coughing. The latter is a characteristic sign. But these immediate irritant effects may not be severe, and commonly pass off altogether in a short time. The man may feel quite well and may continue work. He leaves the mine, has his supper perhaps, and goes to his room. Then, in from perhaps four to eight hours afterwards (very rarely later), acute symptoms suddenly come on, and progress with alarming rapidity. In a typical severe case there is marked and increasing distress in breathing, with coughing, and often severe pain in the chest. The cough is at first dry, and auscultation may at this stage reveal no moist sounds. But this condition is speedily followed by the expectoration of a copious frothy, rather fluid, blood-stained spit. The lungs become waterlogged, and auscultation now reveals copious moist sounds. There is cyanosis and marked dyspnoea and distress, followed, unless the case is promptly treated, and very often in spite of all treatment, by collapse, unconsciousness, and death *within a few hours*. Dr. Macaulay states that "the temperature is at first normal or subnormal, but, if the gas goes on for several hours, a rise takes place." I well remember the first case of this condition which I saw, now more than ten years ago. A miner was taken ill suddenly in his room on one of the mines at 11.30 p.m. I saw him at 1 a.m. He was cyanosed and in much distress. His lungs were full of moist sounds and one base was dull. The wooden floor of his room was covered with a blood-stained fluid expectoration. He died at 5 a.m. I could not reconcile his condition with that of any form of acute pneumonia which I have seen, but it agreed at every point with the published descriptions of nitrous fumes poisoning. It is probable, I think, that a certain number of cases returned as "pneumonia" amongst underground workers are really cases of nitrous fumes poisoning.

The typical sequence of symptoms in nitrous fumes poisoning is therefore this:

1. *Initial symptoms* of irritation occurring at the moment of exposure and usually comparatively slight. Nitrous fumes never, in our experience of ordinary gassing accidents, produce partial or complete unconsciousness at the time of exposure, as does carbon monoxide, although they may do so if present in massive amounts, and cases of rapid death from the concentrated fumes of burning explosives may be partly due to this cause.
2. *A latent period of several hours' duration*, during which the patient may and commonly does feel quite well.
3. The *sudden onset after that interval of acute symptoms*, due to a rapidly progressive inflammatory oedema of the lungs. The appearance of this well marked symptom sequence is of great diagnostic significance.

The *post-mortem* signs are also definite. There is an intense injection of the trachea and bronchi, which is characteristic. The lungs are intensely oedematous, often enlarged and tense with oedema. A copious frothy, blood-stained fluid exudes from them on section, and may be seen to occupy the air passages. There may be patches of incomplete consolidation, subpleural haemorrhages may be observed, and blood-stained fluid in the pleural cavities or the pericardium. The right heart and the great thoracic and abdominal veins are engorged with dark, thick, sometimes almost tarry, blood. The abdominal veins especially are often very greatly distended.[4]

There is one other point. Miners from time to time complain that after slight exposure to blasting fumes—perhaps from blasting at some distance from their working place—they are attacked the same night with difficulty of breathing, and perhaps slight spitting of blood, which pass off in a few hours. The affected man thinks he has had an attack of "asthma" or "bronchitis." He has really had a slight attack of nitrous fumes poisoning. The most sedulous care must be taken that, if any casual blasting has to take place before the end of the shift, the water blast shall be invariably employed immediately after, and that the fumes are thoroughly dispersed. Precautions must be taken, also, in the general blasting at the end of the shift, in order to obviate the risk of inhalation of drifting fumes of this dangerous gas by men waiting on the stations before being "hauled" up the shaft.[5]

Finally, I may state that the intensely irritating character of nitrous fumes has suggested that the repeated

* Extracts from a paper on accidents from poisonous or asphyxiating gases in mines, dealing generally with the subject, and also with the organization of the use of rescue appliances in mines, read before the Witwatersrand Branch of the British Medical Association, and published in full in the *Medical Journal of South Africa*.

inhalation of small quantities of this gas may, by maintaining a catarrhal condition of the air passages and lungs, be a contributory factor in the development of miner's phthisis.

The accidents under review fall into two groups: A. Those due to exposure to the fumes of explosives *after blasting* — the ordinary "gassing" accidents. B. Those due to explosives being accidentally set on fire and burned.

A. Accidents caused by the Fumes of Explosives after Blasting.

I found it desirable to subdivide this group into two classes:

1. *Cases in which the Exposure was Immediately or Shortly After Blasting.*

These accidents occurred when persons returned too soon to the working places after blasting, or where they were affected by the fumes of explosives arising from blasting taking place in other parts of the workings. I found that in such cases either carbon monoxide or nitrous fumes poisoning might result, but that the latter type was considerably more common.

Whether the one type of poisoning or the other occurs under these circumstances is due in part to the character of the explosion, since if definite partial burning of the explosive takes place the risk of nitrous fumes poisoning is especially great. But the result will depend also on the duration of exposure. Unless carbon monoxide is present in large amounts, it takes time to produce its effects. On the other hand, the records abundantly show that quite a brief exposure to even small quantities of nitrous fumes is sufficient to produce serious or fatal poisoning from this source.

For the same reason drifting fumes from blasting will typically cause nitrous fumes poisoning, and persons may be "gassed" in this way by the fumes from blasting which has taken place at some considerable distance. Sometimes one or more of a party working in close proximity may be affected, while others escape.

Mixed poisoning must sometimes occur, but the number in which the evidence points to the probability of such a conjunction is surprisingly small. One or other type is almost invariably markedly predominant. I know of no case in which a man who had been rendered unconscious by carbon monoxide and had then recovered, developed later on signs of nitrous fumes poisoning. On the other hand, it is probable that carbon monoxide may co-operate in some cases of nitrous fumes poisoning in aggravating and prolonging the initial symptoms.

Another interesting point is this: It appears from the evidence that the danger from nitrous fumes exists only for a comparatively short time, perhaps an hour or so, after blasting. The longest interval observed between the occurrence of blasting and the occurrence of exposure, in this type of poisoning, was two hours, and this was exceptional. This circumstance, I would suggest, is probably due to the fact that nitrous fumes are very soluble in water, and that mine air is always highly charged with moisture, and also to the circumstance that these fumes are not often present in large quantity after blasting.

Let me now quote a few typical instances of accidents of this sort. These will suffice to indicate the circumstances in which these emergencies occur, and the general nature of the evidence on which I have relied. Some are drawn from the cases originally investigated, some were of more recent occurrence.*

Case I.—*Exposure Immediately After Blasting: Poisoning by Nitrous Fumes: Three Deaths.*

The following interesting case was described by Dr. D. Macaulay. It was amongst the first in which the part played by nitrous fumes poisoning in gassing accidents was clearly recognized.

Two white men and three natives were working at the end of a drive, with a crosscut leading off it about a hundred feet from the face. The miners in the crosscut blasted at 3 p.m., before the party in the drive had left, and without giving them warning. The latter were imprisoned in the end of the drive for three-quarters of an hour. They felt that they were being gassed and turned on the compressed air. When the smoke had cleared they left the drive and went to the surface. The white men washed, changed, had their evening meal, and went to their quarters. Acute symptoms of respiratory distress came on *in both* at 10.30 p.m., and when seen by Dr. Macaulay at 11 p.m. they were so ill that doubt was entertained by him whether it was possible to move them to the mine hospital a few hundred yards away. Both eventually recovered under energetic treatment. Nothing was reported at the time regarding the natives. They went as usual to the compound and did not report sick. Next morning one was found to be dead and another moribund. The third was very seriously ill, and he also eventually succumbed.

A *post-mortem* examination on these natives, made by Dr. Macaulay, at which I had the opportunity of being present, showed the typical signs of acute inflammatory oedema of the lungs, and great engorgement of the heart and venous system with dark blood.

Case II.—*Exposure Immediately After Blasting: Poisoning predominantly by Nitrous Fumes; One Death.*

A white miner blasted the cut in the face of a drive. He did not use the water blast. He then returned with two natives to charge and blast the round, turning on the compressed air when doing so. As three holes of the round did not explode (there was therefore probably imperfect detonation and partial burning), he returned a second time to refire them. The natives stated that both times they returned "the smoke was too thick," and one failed to reach the face the second time. The white man did not say anything, but they saw that he was affected by the smoke. *All left the mine together*, apparently at 8 o'clock or a little after. The white miner felt ill on arriving at the surface, and waited for some hours in the change house. Afterwards he set out to walk home, then he telephoned for a cab. He walked from the cab into his house, reaching the latter after midnight. The medical officer of the mine was sent for to see him at 1.30 a.m., and found him "suffering from the effects of gassing usually ascribed to nitrous fumes." The man was too ill to be moved to hospital. He died at 2 p.m. the following day.

This case is an amazing example of a man throwing away his life, through sheer recklessness and contempt of the regulations which govern, or should govern, blasting operations.

In this case the prolonged character of the initial symptoms suggest a mixed poisoning, and the circumstances of the accident render this probable. The later symptoms were typical of nitrous fumes poisoning.

Post mortem the lungs were found to be tense ("ballooned") and oedematous.

The district surgeon, Dr. T. B. Gilchrist, states that the blood was somewhat chocolate coloured, but that after an hour's exposure to the air it became more red. No carboxyhaemoglobin was found in the blood.

2. *Exposure Delayed until Several Hours After Blasting.*

These cases occurred when the working places were entered on the following shift. They were caused by the stagnation of blasting fumes in close places owing to defective local ventilation, due either to the miner responsible having neglected to use the means of ventilation provided, or less commonly to the fact that the means of ventilation provided were inadequate. In every instance in this class carbon monoxide was the predominant cause of death, no doubt with carbon dioxide co-operating in some cases. Nitrous fumes poisoning *never* occurred under these conditions. It is only caused when the exposure occurs immediately or shortly after blasting, or after the actual burning of explosives.

B. Accidents due to Explosives being Accidentally Set on Fire and Burned.

The number of observations which have been made on the composition of the fumes actually evolved when nitroglycerine explosives are burned in air is not large. Recorded results vary considerably, and the actual result which occurs when accidents from this cause happen underground also probably varies between rather wide limits. Dr. James Moir considers that, if the supply of air locally available in places where explosives are burned is sufficient to allow of vigorous combustion, the amount of carbon monoxide generated may not be greater, and may be less, than when the explosive is detonated. On the other hand, if the supply of air is insufficient, as may happen in a confined space, the amount of carbon monoxide will be increased in direct proportion to the degree of deficiency of air, and that of carbon dioxide correspondingly diminished.

In either case, however, but especially in the latter circumstances, large quantities of nitrous fumes will be evolved, within limits, varying according to the particular conditions present, from 1 to 5 cub. ft. per lb. of explosive burned, blasting gelatine being taken as the type. The latter figure agrees with that of Cullen and Greig.[8]

* I have to thank Mr. R. N. Kotzé, Government mining engineer, for permission to publish these illustrative cases.

Dr. Moir has supplied me with the following figures, which represent the behaviour of blasting gelatine in the several conditions specified in the table:

Table showing Quantity in Cubic Feet of Gases produced by 1 lb. of Blasting Gelatine under Different Circumstances.

Conditions.	CO_2	N_2	CO	NO
A. Perfect explosion, without wrapper ...	6.2	2.9	—	—
B. "Practical" explosion, with wrapper ...	5.5	2.9	0.9	?
C. Burned without wrapper in excess of air ...	5.7	2.3	0.7	1.2
D. Burned *in vacuo*	—	—	6.0	5.0

When burning takes place in the dead end of a drive or similar place combustion might be expected to begin as in C, and to finish as in D, according to the available air. The calculations are for pressure and temperature at a depth of 1,500 feet.

These being the determining conditions, one might conclude that nitrous fumes poisoning would be the type of gassing most frequently met with when explosives are set on fire underground, but that carbon monoxide poisoning may also occur. Experience shows that this is actually so, but a rather closer description of what happens is perhaps desirable.

1. When large quantities of explosives, say from 50 to 100 lb., are set on fire, their ignition is frequently followed by their explosion, and this fact introduces an important complication. I have therefore subdivided this group of accidents into two classes, according as explosion did or did not follow ignition. The former class includes one appalling disaster which happened on the Rand some years ago. Happily no accident of similar magnitude has occurred since.

CASE III.—*Ignition of 100 lb. of Blasting Gelatine, followed by Explosion: Sixty-one Deaths.*

In this case a miner, apparently, so far as the evidence goes, through sheer carelessness, set fire to the explosives in his explosives box at a shaft station. Three other boxes were near by, the four containing perhaps 100 lb. of gelatine, and the whole quantity was involved in the violent explosion which almost immediately followed. The station on which it occurred was completely wrecked, and much damage was caused for a considerable distance up and down the shaft. A large number of natives and some white men were in or near the shaft at the time waiting to ascend to the surface. Three whites and many natives were killed outright or succumbed before the rescue parties could reach them, perhaps an hour later. Many of the bodies were severely burnt; some had sustained other gross physical injuries. In those out of this number who survived the immediate effects of the concussion, shock, and burning caused by the explosion, carbon monoxide poisoning was probably the main cause of rapid death. Other whites and natives died later on from the after-effects of fumes, shock, and burning, but, in the absence of fuller information, one cannot push the analysis further.

I have therefore included the whole number under the heading "Indefinite." The eventual toll of deaths was six whites and fifty-five natives. Many members of the rescue parties were temporarily overcome by the fumes, but fortunately none died.

In a smaller accident of the same character perhaps 30 lb. of gelatine was set on fire and exploded, and involved in the explosion a similar quantity of gelignite 20 ft. away. A 6-gallon tin of paraffin was also ignited. Five coolies died later from the burning and battering of the explosion. They were not "gassed," as the fumes did not reach them. But a white miner who encountered the fumes 1,200 ft. away died the same night from acute oedema of the lungs.

2. If we eliminate accidents complicated in this manner, the preponderance of nitrous fumes poisoning in accidents due to burning of explosives becomes at once apparent. Out of fifteen such accidents, carbon monoxide (or mixed) poisoning was the cause of fifteen deaths in one (Case IV), and of one death in a second accident, although in this case other individuals were affected by nitrous fumes. In the other thirteen all the deaths were due to nitrous fumes poisoning.

What appears to happen is this: If the amount of explosives burned is large, and the fumes are met with in great concentration near the site of burning, a rapidly fatal massive poisoning results, which is certainly mixed, but in which carbon monoxide is probably the predominant factor. Or in these circumstances, and in the same accident, out of a number of persons in close proximity to each other some may be rapidly killed in the way described, while others die later with the typical signs of nitrous fumes poisoning. On the other hand, when the fumes have become dispersed, and therefore less concentrated, nitrous fumes poisoning will practically invariably follow. Each one of these results is well illustrated in Case V, cited below, and the first is clearly shown in Case IV.

The larger accidents of this group quite overshadow those due to poisoning from blasting fumes, since in the former large areas of the mine are quickly flooded with poisonous gases, and many deaths may result. Fortunately the greater number of accidents due to burning explosives are of a less tragic nature. These have occurred from smaller quantities of explosives being accidentally set on fire in the workings through carelessness or misadventure. The insatiable curiosity of natives to find out what really happens when gelatine burns has been the cause of not a few.

In such cases carbon monoxide poisoning may also occasionally result if the fumes are sufficiently concentrated and exposure sufficiently prolonged. Usually, however, when explosives are set on fire there is a hasty stampede to a place of safety. But nevertheless, let me repeat, a very brief exposure to the fumes of burning gelatine or gelignite, even although it be only a stick or half a stick, is quite enough to cause fatal poisoning by nitrous fumes. Nitrous fumes poisoning is therefore the typical and characteristic form of "gassing" under these circumstances. Several deaths have occurred from the inhalation of these fumes in lighting up with the old-fashioned "cheesa" stick, made of strips of blasting gelatine. The use of lighting sticks of this sort has as a consequence been prohibited for some time.

I shall quote three further cases of accidents of this group, each of which illustrates one or other of the points I have mentioned.

CASE IV.—*Accidental Ignition of Gelatine Dynamite (15-20 lb.): Carbon Monoxide (or mixed) Poisoning: Fifteen Deaths.*

A gang of thirty natives under a white miner were proceeding to their working place in a stope. The natives arrived first; some descended the stope; the others, fourteen in number, remained on the level above, in which, between them and the station, was the miner's explosives box. The miner followed, and had reached his box and passed it, when immediately an alarm was raised. Fifteen, perhaps twenty, pounds of gelatine dynamite contained in the box had become ignited, apparently, so far as the facts are obtainable, through the carelessness of the miner. The boys on the level rushed towards the station, right into the fumes, and all collapsed at once and dropped within a short distance of the box, where their bodies and that of the miner were found. The natives in the stope below the level escaped. Exposure was thus immediate, and apparently death almost equally so.

The blood from three of these cases was examined in the Government Laboratory. In each case it was cherry-red in colour and uncoagulated. It contained a high percentage of carbon monoxide, and the chemical evidence was stated to point to an "oxide of nitrogen" as a contributory cause. Clearly here the proportion of these gases in the air at the moment, no doubt in conjunction with carbon dioxide also, was high enough to cause immediate unconsciousness and rapid death, and the case may be regarded as one of mixed poisoning, although carbon monoxide was probably the preponderant cause.

CASE V.—*Burning of 50 lb. of Blasting Gelatine: Six Deaths from Carbon Monoxide (or mixed) Poisoning; Nineteen from Nitrous Fumes Poisoning; One from Pneumonia.*

A white miner, S., was seen at 7.45 a.m., sitting beside his explosives box, which was at the dead end of a short crosscut communicating with a main level (14) and air-way. The explosives box was open, and he had a lamp and candle in dangerous proximity to it. One native witness stated that the candle was actually stuck on the corner of the open box.

A few minutes afterwards a flame was seen in the place. The miner ran out, and having told his own natives who were working near by to turn on the air into their working places, as there was gas about, he went away, and warned no one else. He afterwards denied all knowledge of how his explosives had gone on fire, but was eventually convicted before a magistrate and sharply sentenced.

Several witnesses say that they heard a blast, which may have been due to the explosion of part of the burning gelatine. There was certainly, however, no violent explosion. The fumes poured into the level and were carried by a strong ventilating current up the nearest stope, 70 ft. away, and so to the level above (13). There were natives and a white man (who afterwards died) working in this stope. This man at once ordered his natives out. Six were afterwards found dead or dying in the level above, having been overcome in the attempt to escape. Nineteen other natives died later on in the

mine hospital, and fifteen of these had been working in this same stope. The fumes spread for a considerable distance along Level 13, 600 ft. or 700 ft. in either direction, and ascended to Level 12 through several stopes in which many natives and some white men were working. Many of these were affected.

The medical record of these cases is of great interest. For it I am indebted to Dr. A. H. Watt, of the Simmer and Jack Hospital, who saw and treated them.

The six natives found dead were exposed to the fumes in great concentration, being nearest to the original seat of burning. Death in their case was presumably due to mixed poisoning from carbon monoxide and nitrous fumes.

Fifteen other natives from the same stope and four from other working places died in the mine hospital later with symptoms of nitrous fumes poisoning. Eight of these were dead or moribund on admission. They had not been overcome by the fumes at the time of exposure, and had been withdrawn from the mine in the ordinary way. In fact, during the day and through the evening large numbers of natives were admitted to the mine hospital suffering from respiratory symptoms. Many of these had been working in the stopes between 13 and 12 levels, where the fumes had travelled a greater distance before reaching them. They were recognized as suffering from nitrous fumes poisoning, and in the bad cases free bleeding was carried out, followed by respiratory stimulants. Dr. J. B. Tough informs me that in six natives whom he found comatose with a thin froth issuing continually from their mouths and who were freely bled, the colour of the blood changed during the operation from a dark asphyxial colour to that of oxygenated blood. All six recovered. Excluding those dead or moribund on admission the number treated was sixty-seven. One native died ten days later from pneumonia.

Fourteen white men were also affected by the fumes. What happened to them may be best described in Dr. Watt's own words:[6]

"Thirteen of them" (who, under his orders, came to hospital and were detained there overnight) "had an emetic, and the next day were all out of danger. One man disobeyed orders, and went home without receiving an emetic. He was sent for, but he had gone out for a stroll after having partaken of a hearty luncheon. He was found four hours after the accident, and came to hospital under protest, stating that he felt quite well. In the evening he developed general oedema and congestion of his lungs, and died before morning." This was regrettable, as this particular man had been active in getting the boys out, and had inhaled the gas in so doing.

Unfortunately, the *post-mortem* evidence in this case is incomplete. Not all of the bodies were dissected, as this was unnecessary for the immediate purpose of the district surgeon. Dr. Moller informs me that those which were examined did not show any signs of carbon monoxide poisoning. The blood was dark and the lungs very oedematous.

Pure carelessness on the part of three white miners was responsible in these two instances, and in the shaft accident already mentioned, for over one hundred deaths. If the regulations regarding the handling of explosives had been observed not one of them would have occurred. The careless miner (we have met with him rather frequently in these records) is a standing danger, not only to himself but to every one near him. Recklessness such as this is not fair play. But these accidents suggest that it might be well to provide all those engaged in the actual handling of explosives with approved (and tested) electric lamps for use in so doing.

I should like to mention, in a word, another occurrence, in which 100 lb. of gelatine was accidentally set on fire by a white learner when capping fuses. He himself and three natives died—the natives certainly from nitrous fumes poisoning. But, although the fumes spread for considerable distances through the mine, no one else died, owing to the prompt and resourceful action of the mine officials. Being immediately warned of what had happened, they at once withdrew all the workmen from the portions of the mine affected to fresh air. This is obviously the only thing to do. Every one should at once get by the nearest way out of the air current bearing the fumes. Rescuers also should be careful to approach places where burning has occurred only from the windward side. The familiar wet handkerchief over the mouth should not be omitted. Several men have saved themselves, when cut off from safety by the fumes, by retreating into a dead end and turning the air on at the face. Sometimes, however, this has not sufficed to protect them from nitrous fumes.

When small quantities of explosives are set on fire, every one should leave the place at once until it has been thoroughly blown out and wetted down. Neglect to do so was the cause of the following accident, the last which I shall quote. In this instance a much smaller quantity of explosive was ignited, and nitrous fumes poisoning followed. Observe once more in this instance *the almost clockwork precision with which this poison does its work.* Compare it in this respect with Case I.

CASE VI.—*Accidental Ignition of 5 lb. of Gelatine: Nitrous Fumes Poisoning: Four Deaths.*

About 1.20 p.m. on a Saturday a miner (G.) accidentally set fire to half a packet (about 5 lb.) of gelatine in a stope. Another miner (H.) and his natives were working at the top of the stope. The fumes ascended the stope to the level above, through part of which men and boys had to pass. G. withdrew his boys and immediately warned H., who left the stope with his natives, and waited with them not far away in the level above for a short time. He then insisted (about 2 p.m.) on returning to charge his holes, although warned not to do so, and took with him a native. He was followed by G. They finished their work and all left the mine together afterwards. H. said he did not feel sick, and both men took the tram home.

Five natives were affected by the fumes. All went to the compound, but about 7 p.m. two became very ill and were taken to the mine hospital. They were spitting blood. One died in a quarter of an hour, the other the following day.

Just at the same time (8 p.m.) the mine medical officer was called to see H., and found him sitting on the side of his bed, with a pulse of 120, expectorating blood-stained sputum. There were signs resembling those of commencing pneumonia at one base. The medical officer made arrangements to send him to hospital the following morning. At 3 a.m. he was dead, thirteen hours after exposure to the fumes.

Two other natives were taken to the hospital at 3 a.m. One died the following day; the other recovered.

The *post-mortem* notes on these four cases were kindly supplied to me by Dr. Stanley Heberden, district surgeon, who certified all as having died from nitrous fumes poisoning. All four reports are couched in almost identical terms. A summary of two will suffice.

Native S. (the boy who died within six hours after exposure). No disease of internal organs. Air passages full of froth; mucous membrane congested; lungs congested and oedematous. Right side of heart engorged with blood. The blood was dark and asphyxial in character. There was no alteration in colour suggesting the presence of carbon monoxide.

R. H. The body of a well-nourished European male. No injuries. The mucous membrane of the air passages is congested and the tubes are full of froth. The lungs are congested and tense with oedema. The right side of the heart is engorged with blood. The blood is dark (asphyxial), and there is no alteration in colour suggesting the presence of carbon monoxide.

MEDICAL TREATMENT.

Regarding the medical treatment of nitrous fumes poisoning there has been a good deal of local experience.

In all cases in the early stage, first produce emesis as soon as possible (apomorphine hypodermically). Follow this by stimulant, ammonia, or (preferably) pituitrin. Then send the case straight to hospital.

Atropine may prove useful in the latent stage.

In the acute stage with developing oedema of the lungs, Macaulay[4] recommends as the first step wet cupping of the chest, back and front. This invariably relieves the symptomatic distress. It should be followed locally by poulticing, or better by jacket mustard-water fomentation, applied very hot and changed every hour.

In all recognized cases of acute oedema free blood-letting should next be performed. This is a most valuable remedial measure. In one of Macaulay's cases, after venesection, the haemorrhagic sputum speedily ceased, and never returned, and the patient made an uninterrupted recovery. Dr. Tough's experience, already quoted, also clearly shows the value of this measure. This has been confirmed by other observers. The condition of the blood may render bleeding difficult, but it should be free (12 to 20 oz.). *Venesection should not be delayed until the condition becomes grave.* It should be undertaken immediately on the recognition of the nature of the case.

Follow venesection by saline infusion, and repeat this if necessary.

Administer oxygen intermittently to relieve and tide over the asphyxial condition.

Give ammonia in repeated doses.

Injections of pituitrin (1 c.cm.), repeated every four hours, should be tried. I have found this drug, used in this way, of great service in the treatment of acute pneumonia.

These are the lines of treatment which have been followed locally, and in a considerable number of cases with marked success, although when the condition of acute oedema is well established probably a majority of cases will die in spite of treatment.

I had written the above notes before I had an opportunity of seeing the very valuable report by Lieutenants Elliot Black,

Glenny, and McNee, R.A.M.C., on Cases of Poisoning by Noxious Gases used by the Enemy.[7]

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NOTE ON CASES OF PHLEBOTOMUS FEVER AT AN ISLAND IN THE EASTERN MEDITERRANEAN.

BY J. T. D. S. HIGGINS, M.B., B.A.,
SURGEON, R.N.

EIGHT cases of phlebotomus fever occurred amongst the officers and men attached to the garrison under my charge. These were due to infection by *Phlebotomus papatasii*. Seven cases occurred between July 21st and August 1st, 1915, and one other case on August 9th.

Six of these cases occurred in one locality and in one house. The patients were either mess-servants, sentries, or officers (1) who were on duty at and slept in this house. One case was an officer's servant (Private R.M.L.I.). He came in from another camp, and slept only one night at the house. On the morning of the fourth day afterwards he became ill with the fever. All the other patients had numerous marks of bites. They resembled mosquito bites; but the sandfly bites silently; it does not give warning of its presence by any peculiar musical note, as does the mosquito. A very faint note may sometimes be heard if the fly passes close to one's ear. The sudden sharp sting, when the phlebotomus bites, is sufficient to wake one from sound sleep.

After the first case, on account of the type, sandfly infection was suspected; the suspicion became greater when the localized incidence at the house became marked. A search was made for phlebotomi in the house, culex larvae (? dengue) being searched for at the same time in the wells, etc., as the marks on patients' wrists and ankles closely resembled mosquito bites. No culex larvae were found, but phlebotomi were found in the house, and later inside the mosquito net of an officer, who had been severely bitten and developed the fever. These were caught and proved to be *Phlebotomus papatasii*. Although specimens had been seen at the Royal Naval College, Greenwich, during the tropical course, after entry, I was not certain that this was the genuine sandfly, but the diagnosis was confirmed by Colonel Garnier, R.A.M.C., Egyptian Medical Service, and they were later examined in company with Dr. A. De Lisle, attached to the French Army Medical Service.

The following prophylactic measures were taken:

1. The sleeping place of mess-servants and sentries was changed from the hall on the ground floor to the lobby on the next floor higher up.

2. A space of ground alongside the house, but not part of the premises, contained old rubble, refuse, and fallen masonry, and was thought to be the probable breeding place and habitat of the fly. This was cleared and covered with lime; quicklime was applied for in order to spray or wash down all these old walls and crevices, but was not immediately available.

After these measures were taken no fresh case occurred, but this was probably in part due to the fact that a slight change in the weather followed, and the temperature dropped below 70° in the evenings, which is unfavourable to the continued presence of phlebotomi. The weather during June and early July was probably too hot and dry for the larvae to hatch out.

As was gathered subsequently from articles published in the BRITISH MEDICAL JOURNAL, and seen by me in September, prophylactic measure No. 1 above was probably more effective in the circumstances than was hoped for at the time. In the place where the men previously slept they were exposed to the flies from the rubble, etc., which was only a few yards away across a narrow by-way, and level with the open windows of the hall, so that the flies entered each evening, probably attracted first by the light inside. As the phlebotomus does not tend to ascend much in flight these flies probably did not reach the second lobby, where the men afterwards slept. Although they remained in some of the rooms during the day this lobby was too bright to suit them, and there was always a free draught there.

The case which occurred on August 9th, 1915, was that of a ship's steward (pensioner, aged 43). This case occurred at another building, an old castle. His office and store were in a part of the castle suitable for the fly, that is, inside one of the old stone turrets. This building was not used by the men.

The flies were of a dull pale yellow or sand colour. Two dots of black pigment at the eyes were conspicuous when the fly was caught. The body was curved on itself in hump-backed fashion. The wings were long and narrow, and with a magnifying glass were seen to have long fine hairs along their edges. The wings (at rest) were always carried pointed backwards, upwards, and outwards from the body, diverging from each other. When an attempt was made to capture a fly it did not fly forward, but eluded capture by seeming to jump off at a right angle, alighting again about six or eight inches away in a straight line to right or left.

GENERAL DESCRIPTION OF THE CASES.

Incubation.

From the case of the private (R.M.L.I.), and from consideration of the time of onset after first noticing the bites, this appears to have been about three days.

Symptoms.

The onset is sudden; the patient's face is flushed and eyes puffy and injected as if he had been drinking heavily. He complains of dizziness, severe headache, and pains, generally in the back and region of the hip-joints. He is "tired" and feels very ill. In two of the cases there was nausea and slight vomiting at the onset. The temperature was generally about 101° at the onset, but usually reached 103° or more within ten hours. On the second day it was usually about 101°. In three of the cases it eased to normal on the evening of the second day. In the others it did not reach normal until the evening of the third day or later. After becoming normal, in several cases a rise next day to 99° or 99.4° was noted, the temperature afterwards steadying at normal.

During the night of the first day and subsequently, pain in the back, sacral region, and joints was marked, and also pain across the eyes; the eyeballs are rather tender to pressure. The patient slept little and did not sweat. By the second day the tongue was covered with a white fur, except at the tip, and the patient had no appetite. One patient had slight diarrhoea, but the others were constipated. The pulse-rate was never more than 80 in any of the cases, even when fever was high. In one case there was slight sore throat, and in another slight stupor and delirium on the third night.

After Effects.

A general feeling of fatigue and lack of energy, mental and bodily, lasted for some time. All cases showed this to some extent, but in three it was much less than in the others; these three cases were "two-day" cases. The others remained unfit for duty for a week or longer. The pains and feeling of stiffness sometimes remained. Although the patients said they felt well, they walked about shakily, and as if shrunken inside their uniforms. Their voices were noticed to be weak and rather higher pitched than normally.

Treatment.

During the attack acetyl-salicylic acid was freely given. Quinine was given to the first two cases, but discontinued when it was seen that they were not due to malaria and that quinine did not appear very effective. During the after-period mist. Fowleri was given for about a week.

In his article on phlebotomus fever at Peshawar, published in the BRITISH MEDICAL JOURNAL of July 31st, 1915, Captain Houston, M.B., R.A.M.C., remarks on the tendency of the infection to "cling more particularly to certain bungalows." It is interesting to note that the infection met with above was almost exclusively experienced at one particular house. Also, the detailed corre-

spondence of the symptoms noted above, with accounts published in the BRITISH MEDICAL JOURNAL for Indian phlebotomus, is at once striking and interesting for one without previous experience of this widely-distributed infection.

THE TEMPERATURE NECESSARY FOR THE DESTRUCTION OF LICE AND THEIR EGGS.

By A. W. BACOT,
ENTOMOLOGIST TO THE LISTER INSTITUTE.

THE points concerning temperature dealt with by Dr. Kinloch in his valuable contribution on lice, published in your issue of June 19th, 1915, were so at variance with my experience regarding the heat necessary to kill other insects that I felt impelled to test the matter for myself.

Bugs (*Cimex lectularius*) have been shown by Blacklock (1912) to die at 45° C. (113° F.); subsequent experiments by myself (1914) confirm this, and also show that fleas (*Xenopsylla cheopis*) and cockroaches (*Periplaneta americana*) are destroyed at this temperature, or a few degrees higher. Reports of experiments with mosquitos (*Stegomyia fasciata*), performed under the auspices of the Yellow Fever Commission (West Africa), now in course of publication, show that about the same degree of heat is also critical for these insects.

Living specimens of lice—*Pediculus humanis* (*vestimenti*)—were obtained from two separate sources and treated as a single stock, from which the active insects and nits required for the following experiments were drawn. The breeding method adopted was to line an entomological glass-bottomed box with a slip of dark-coloured cloth and cover the top with chiffon,* through which the insects were fed. This box was nested in one of a larger size for safety and carried in a pocket where the insects had the advantage of the natural heat and humidity of the body.

The method used in the tests was as follows: Pieces of cloth with eggs and active lice on them, or with one or the other only, were taken from the stock box and divided, one portion being kept as a control, the other used for the test. If active lice were present, the piece of cloth was placed in a similar box, covered with chiffon, but if the nits only were tested the cover was not used.

It was found that both the eggs and lice (in their second instar) survived a thirty minutes' trial in an incubator (dry air) at 49° C. (120.2° F.), the lice being apparently unaffected, as they subsequently completed their development. Living lice, however, were killed by thirty minutes' submersion in water at 50.2° C. (122.3° F.); at the same temperature in dry air they were paralysed and rendered incapable of other movements than a feeble motion of the legs; 28 out of 32 specimens in all stages of growth died within a few hours, but 4 (two in the second and two in the third instars) survived.

Another trial was carried out at 54° C. (129.2° F.). Thirty-five minutes after the lice were placed in the incubator they were all dead, and, up to the time of writing—over three weeks after the test—no young have emerged from the eggs submitted to this temperature, though the control box is swarming with lice in all stages of growth.

Eggs on pieces of cloth were dipped into water boiling at 98.4° C. (209.1° F.) for one minute and a half-minute respectively, and, as was to be expected, they turned opaque white, presumably owing to the coagulation of the albumin. They were, however, kept in entomological boxes and carried in the same pocket as the control eggs; these latter duly hatched, but the tested eggs shrivelled up after drying.

A further test was carried out in a water bath to ensure greater accuracy. One batch of eggs was placed in tap water in a tube, stoppered with cotton-wool, and another portion of the same batch of eggs was placed dry in a similar tube; both the tubes were submerged to within an inch of the rim in the water bath, the registered temperature of which was 55° C. (131° F.). After thirty minutes the eggs were removed and placed in separate boxes, the control portion being placed in a third. All three boxes were kept together in the same pocket. Up to the time of writing (sixteen days after the trial) no eggs have hatched in either of the test boxes, while many active lice in various stages of growth are present in the control box.

While it is, of course, possible that eggs having a long hatching period may survive a temperature which kills those which develop more rapidly, it is so improbable that I have no hesitation in concluding that dry heat or submersion in water at 55° C. (131° F.) kills both active lice and their eggs. It follows as a consequence that considerably lower temperatures than those usually employed may be used to destroy these vermin. For the thorough sterilization of infested garments the question of penetration is all-important. It is probable that considerable economy in fuel might be effected by allowing a longer exposure at a lower temperature, while it should be practicable to use quite lightly built chambers or temporarily adapted rooms to obtain dry air temperatures of, say, 60° C. (140° F.)

* This method is fully explained in A Study of the Bionomics of the Common Rat-flea and other Species associated with Human Habitations, etc., *Journal of Hygiene*, Plague Supplement III, January 14th, 1914, p. 465.

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CREOSOTE IN RHEUMATISM AND GOUT.

OWING to the great rise in price of acetyl salicylic acid and sodium salicylate, I made a trial as a substitute of creosote in ½-minim doses given in the form of a mixture, as follows: Magnesium carbonate (heavy), ʒj; creosote, viij min.; peppermint water to viij fl. oz. The dose for an adult is one tablespoonful every four hours, with an equal quantity of water.

If pain is severe, the addition of from five to seven minims of liquid extract of opium to each dose is valuable; and when the pain is due to acute gout, the further addition of from seven to ten grains of potassium bicarbonate is also good. In cases of arthritis, associated with great loss of lime salts, prepared chalk (ten grains), or aromatic chalk powder (ten to fifteen grains), may be added with good results.

I have found that cases of acute gout treated on these lines, combined with suitable local treatment, are rapidly relieved, the patient being able to return to his work in less time than before, whilst the interval between the attacks seems to be lengthened.

In cases of catarrh and influenza, with feverishness, it is a good plan sometimes to substitute for the peppermint water solution of acetanilide (2½ grains to the ounce), made previously with boiling water and cooled—the flavouring being made by essence of peppermint.

Cases of lumbago, sciatica, fibrositis, neuritis and arthritis of various types, seem to do quite as well with the creosote treatment as with the salicylic, and one decided advantage is the absence of severe gastric disturbance associated with the use of acetyl salicylic acid in some cases, as shown by anorexia and nausea. In fact, the creosote mixture (modified if necessary to suit individual cases) is of use in gastric and intestinal disorders, and replaces bismuth salicylate very well in some cases.

For patients unable to tolerate the smell or flavour of creosote, as well as for other cases, the substitution of sodium sulpho-carbolate gives good result.

I send these suggestions in the hope that they may help to cut down expenses in panel and dispensing practice, and to obviate the difficulty in obtaining a sufficient supply of the salicylic compounds.

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DYSTOCIA DUE TO CONSTRICTED OS.

HERMAN, in his valuable work on difficult labour, refers to dystocia due to the very rare condition of smallness of the os externum, and the following case is recorded on this account:

A young woman had suffered from procidentia uteri; the uterus had been ventro-fixed by operation, but the procidentia thereafter completely recurred. She became

pregnant for the first time, and on a Sunday began to have labour pains. On the following Tuesday the maternity nurse, having been sent for, called us in, because she could not find the os uteri, although the globose head appeared to be low in the pelvis.

By digital examination we found that the cervix was completely relaxed, but the os externum could not be felt; inspection through a good speculum, after some considerable search, revealed a very small opening, which would just admit a director. It was decided to administer a suppository containing ½ grain of morphine, and await events.

After the expiration of twenty-four hours the pains were strong and regular, and the pulse was increasing in frequency; the speculum enabled a three-pronged cervical dilator to be inserted into the os; the blades were separated to their limit (1 in.), when amniotic fluid, mixed with meconium, escaped in quantity.

The os was now, with the greatest possible ease, dilated by a sweeping movement of the finger, and gave way to the full extent in a very few minutes. A dead child was naturally born, the second stage of labour occupying about half an hour.

The interesting points about the case appear to us to be: (1) In view of the unknown etiology of this condition, the question as to whether the procidentia may have unnerved the dilator mechanism of the external os, this patient having habitually worn, as it were, the cervix uteri outside her body; (2) the rarity of the condition; (3) the remarkable way in which the os adopted its normal behaviour and gave way readily when, so to speak, it was frightened by a dilator.

J. OWEN-JONES.
Holywell, N. Wales. CHAS. E. MORRIS.

IMPROVED TECHNIQUE FOR INTRAVENOUS INJECTIONS AND REMOVAL OF BLOOD FROM VEINS.

MAY I say a word in confirmation of Dr. Alfred Codd's suggestion (JOURNAL, December 11th, 1915, p. 861) of the sphygmomanometer as an apparatus for blocking the venous flow in the upper limb when it is desired either to introduce remedies into the blood stream or to withdraw blood from the veins? I have used this method for some time and can fully endorse all that Dr. Codd says of its value. Personally, I find an instrument with an anaeroid index more convenient than the more bulky mercurial register, but really neither the one nor the other is necessary if a clip is fixed on the india-rubber tubing attached to the ball pump on the side remote from the index; the amount of pressure needed can be readily regulated by the finger placed over the radial artery. Either with or without this modification it is perfectly easy to give an intravenous injection without any assistance other than that which the patient can afford, and this is one of the special merits of the method. All that is necessary is to place between the patient's thumb and index finger of the limb which is not being operated on the clip in the one case, or the junction of the india-rubber tube and the ball-pump in the other, and to instruct him to make the required manœuvre at the word of command. The release of the pressure is instantaneous—even more rapid than from a turn of the escape cock—and this without the slightest risk of dislocating the point of the needle from the interior of the vein.

As a practical point I would add that the armlet prior to inflation should not grip the arm too closely; unless this is remembered there may be, even after the airbag has been emptied, sufficient pressure to cause blood to escape from the punctured vein and so to produce an unnecesary haematoma.

London, W. C. O. HAWTHORNE.

THE volume of *Studies from the Department of Pathology of the College of Physicians and Surgeons, Columbia University*, consists of reprints of monographs and reports representing the results of the work done in that department during the collegiate year 1913-14. The cost of reprinting and issuing the studies is defrayed by a special grant from the university itself, and no longer, as before, by an association of its alumni. The collection includes some valuable scientific reports.

Reviews.

TWO WAR BOOKS.

MR. J. M. ROBERTSON, M.P., in his *War and Civilization*,[1] has reverted to the fashion of the polemical letter. It proves most excellently adapted to his purpose and to his style, for, though he is widely read in German, he is too deeply steeped in Elizabethan English to be anything but direct when he wishes, and in this letter he is very direct.

The letter is addressed to Dr. Gustaf F. Steffen, Professor of Economics and Sociology, Stockholm, who three years ago was professor of the same subjects at Gothenberg. Professor Steffen, it is stated, published a book in Swedish early in 1915, which has been translated into German with the title *Krieg und Kultur*. Professor Steffen's main proposition seems to be that if of two combatant nations one can, in his opinion, lay claim to higher intellectual qualities and a more zealous cult of the State than have been developed by the other, it is justified in any war it wages, on any pretext, with that antagonist. Mr. Robertson is puzzled, as well he may be, that a work of a professed student and teacher of social science should take as an absolute premiss the inevitableness of a German effort to destroy the British Empire, while at the same time laboriously criticizing British writers who take a hostile view of Germany's action in precipitating the war. Professor Steffen's thesis seems to be somewhat as follows: Germany desires to expand at the expense of other nations, and such a right vests in those willing to exercise it. Germany will be able to exercise it when she crushes Britain and destroys its command of the seas. The rights of other States do not count. Not being able to make a successful aggression they have no right to resist, and those who cannot resist aggression have no rights at all. Germany is a great and gifted and noble-hearted nation, which has produced admirable music. Her militarism is necessary to her. What Britons ought to do is resign themselves to her inevitable supremacy.

If this be so, the attitude of the German is due to a mixture of pride and envy, and, says Mr. Robertson, "we are no more surprised at his new ethical positions than we were at those of the company of *Gelehrten* who defended the infernal wrecking of Belgium by asserting the superiority of German Kultur. We are, in fact, now incapable of being surprised at any ethical developments that may take place in a country in which the gospel of war for war's sake has become predominant. That seems to be really the fundamental issue." Mr. Robertson then proceeds to examine the allegations as to the ennobling effects of war on character, but we have said enough already to show the character of his book, and need only perhaps deal with one other matter. To many readers of our profession the most interesting part of his letter will be, we suspect, the section on the pseudo-science of national psychology, and those following in which the subject is developed. *Völker-psychologie* is the so-called science which labels the French as frivolous, the German as solid, the Russian as dreamy, the English as slow-witted, the Irish as quick-witted, the Scot as cautious, and so on. No one with any adequate knowledge of men, or even with a sense of humour, would take labels of this sort seriously, but the Germans took *Völker-psychologie* very seriously; it ministered to the frame of mind which led them to believe that the German type of civilization, the German way of thinking, power of organization, and so on, were superior to those of all other nations, and that therefore they were justified in provoking the war and the atrocities committed by themselves in Belgium, and by their allies, the Turks, in Armenia. Since, as the history of Germany itself shows, a race can change its psychology from generation to generation, nothing, scientifically speaking, is left of *Völker-psychologie* but the conception of political aggregates of human beings of a given grade of culture, swayed for the time by prevalent teachings and induced states of mind. Mr. Robertson sums up his thesis in the following sentence, with which his book concludes: "The psychology of your friends is the psychology of the braggart. The science of war they

[1] *War and Civilization: An Open Letter to a Swedish Professor.* By the Right Hon. J. M. Robertson, M.P. London: George Allen and Unwin. 1916. (Cr. 8vo, pp. 160. 2s. 6d. net.)

mastered like the other physical sciences; and they took for granted that their mere barbaric instinct, their race-pride, and their appetite to power yielded them a science of man, a *Völker-psychologie*, in which their ascendancy was deducible even as might be the operation of an explosive shell in physics. That is to say, in the most essential knowledge of all, in comprehension of the vast process of international action and reaction, of the way of working of the souls of nations and of free men, they are the most profoundly unscientific of all the civilized peoples, and by consequence they are the most barbarous. That is my thesis."

We trust that we may not, by any such defect in this notice, have given the impression that Mr. Robertson's letter is in the least dull; there is not a dull line in it, and, apart from the brilliancy of the whole argument, it contains some striking quotations from German documents, including extracts from the diary of Private Becker (in civil life professor of Latin at the Bonn Gymnasium), which contains part of the story of the inimitable Lieutenant Reinicke and how he got the Iron Cross.

A book of a very different kind is *German Culture*,[2] edited by the Professor of Divinity in the University of Edinburgh, and published last year. It contains a series of essays, written for the most part by Scottish professors, in which an attempt is made to appraise the value of the contribution of the Germans to knowledge, literature, art, and life. At the outset the editor is in trouble to find an English equivalent for "Kultur," and defines it as civilization viewed on its higher side, but we would add, with a special limitation to the German variety, based on the ideas of State organization in civil life and terrorism in war. The longest essay, and that which bears the title, "What science owes to German investigators," is by Professor Arthur Thomson of Aberdeen, and though it could not have been in better hands the result is not satisfying. Professor Thomson does not really grapple with the German thesis, which is, not that science owes much to German investigators, but that Germany is supreme in science, as in other departments of human activity. Professor Thomson does not subscribe to this claim to supremacy, but sets himself to prove that "it is as inaccurate as it is ungrateful to belittle the debt of science to German investigators." He gives lists of the men most distinguished in the various sciences in parallel columns, Britain, France, Germany, other countries—we should like to quarrel with him for arranging them in alphabetical order, which means nothing, instead of chronologically, which would have meant a good deal. Of the names of living men in the German column most, if not all, were among the 93 who signed the deplorable declaration by German professors and men of science. The arrogance and narrowness of mind displayed in the manifesto produced a reaction in this and other countries from an attitude of undue adulation and imitation to one severely critical. We believe the reaction to be healthy and for the good of all the nations, including the German. Germany claimed supremacy in science as it claimed hegemony in Europe and, indeed, throughout the world, including the western hemisphere. The claim to hegemony was in fact founded on the alleged supremacy. The fact is that, as Professor Thomson in the end seems to have recognized, he set himself an impossible task. He has not been content to fulfil the promise of the title of the volume by giving an account of the contributions of the Germans to scientific knowledge, but has attempted to appraise the value of German contributions, not to the details but to the inspirations of science, as compared with those of other nations. Science is more truly cosmopolitan than any other sphere of intellectual activity; it is, in fact, universal. A mathematical analysis, an observation of a physical phenomenon, or a chemical equation, can have no national or racial colour. All three will hold good not only all over the world, but throughout the whole solar system and beyond. They can only acquire a national colour when it comes to their interpretation, to their manipulation to establish or refute a hypothesis. Moreover, as Professor Thomson recognizes near the beginning of his essay, nationality is an insufficient basis for the scientific analysis of intellectual tendencies and capabilities. The really interesting criterion which would satisfy scientific demands would be race, not nationality. Now, the nations of Europe and North America are made up of a mixture of races, and, as he admits, "perhaps the greatest difficulty is in regard to the Jewish element in the various nations, for the Jews have been extraordinarily inventive and independent, especially in certain departments, such as physiology and pathology. As we have not been able to discriminate the Jewish strain, we have probably given the various nationalities considerably more than they deserve." The general effect of what Professor Thomson has to say is that the Germans are diligent workers, have produced many eminent teachers, some of whom have founded important and prolific schools of research, and a few men who have really made new roads into regions previously closed. He does not say, as we think a strictly impartial historian might have said, that organized research in Germany has also been a sower of tares, and that far too much of the energy of research workers in other countries has had to be given to clearing away the weeds.

Though the writers of nearly all the essays are Scotsmen, the shortest, and perhaps the best, is by a Yorkshireman who has returned to his own county to serve the University of Leeds as vice-chancellor. Dr. Sadler sees very clearly both the strength and weakness of German education. Its strength lies in its extraordinary precision of aim, its high standards of intellectual attainment, its liberal encouragement of organized scientific research, and its wide diffusion and convenience of access. But it has been so framed as to place a weapon in the hands of the dominant power of the State; "the glorification of the State has included the sacrifice of the individual, and that has been conducted ruthlessly in Germany"; and, again, "it has made the minds of individuals too susceptible to current intellectual fashions and has left them deficient in the power of independent criticism and of resistance to governmental control." Is it too much to hope that one of the lessons we shall learn from the hideous misconduct of the Germans will be to avoid the downward path along which some who have been inoculated with the German virus would drive education and the professions in this country?

[2] *German Culture. The Contribution of the Germans to Knowledge, Literature, Art, and Life.* Edited by the Rev. Professor W. P. Paterson. London: T. C. and E. C. Jack. (Cr. 8vo, pp. 384. 2s. 6d. net.)

PRACTITIONERS' ENCYCLOPAEDIAS.

The Practitioner's Encyclopaedia of Medical Treatment[3] is an endeavour to produce a single comprehensive volume on the subject, written by men of wide understanding and experience. It consists of three parts. The first, over 500 pages in length, deals with the methods of treatment to be adopted in the various disorders with which the practitioner is likely to meet, considered under one hundred and twenty headings and more. The second part is devoted to the agents employed in medical treatment, and extends to 270 pages. Here the reader finds compact and up-to-date accounts of the pharmacological actions of the drugs, preparations, and drug-foods that the practitioner may employ with advantage. The third part of the volume is the excellent index, 100 pages in length, in which will be found references to the pages where special information may be found on diseases he has to treat, and drugs or methods of treatment he desires to employ. The introduction is a brilliant piece of writing from the pen of Sir CLIFFORD ALLBUTT, who gives a most engaging survey of the new from the standpoint of the old in the treatment of disease. The editors are to be congratulated upon the excellence of the staff they have collected for the composition of their *Encyclopaedia*. The individual articles of which it is composed appear to reach and to maintain a high level of practical excellence, and to contain just the information for which the medical practitioner is ever on the look-out. We cannot do more than recommend the book most highly, and congratulate the editors, Dr. LANGDON BROWN and Mr. KEOGH MURPHY, upon the success of their venture.

[3] *The Practitioner's Encyclopaedia of Medical Treatment.* Edited by W. Langdon Brown, M.D., F.R.C.P., and J. Keogh Murphy, M.C., F.R.C.S. With an introduction by Sir T. Clifford Allbutt, K.C.B., M.D., F.R.S. Part I: Methods of Treatment. Part II: Agents in Treatment. London: H. Frowde, and Hodder and Stoughton. 1915. (Sup. roy. 8vo, pp. 897. 35s. net.)

The appearance of this volume affords an opportunity, which we gladly take, of noticing the appearance of the second edition of *The Practitioner's Encyclopaedia of Medicine and Surgery*.[4] This came out within a year of the issue of the first edition, a fact that may be taken to show that the book supplied a definite want. It is not too much to say that it is a work reflecting the highest credit on its editor, Mr. KEOGH MURPHY, and his many scores of contributors. Here the practitioner will find covered the whole field of medical and surgical practice in all its branches, and covered well. Medicine, surgery, anaesthetics, obstetrics, gynaecology, diseases of the special organs of sense, diseases of the skin, and special forms of treatment, all receive exhaustive consideration in turn. The articles are full of information useful to the general practitioner; where necessary, illustrations have been added to improve the clearness of the text. The book is one that should be in the hands of every practitioner of medicine, unless, indeed, he chances to own a copy of the first edition.

PRIMARY TUBERCULOSIS OF THE LUNG IN CHILDREN.

THERE has always been some dispute as to the primary focus of the tuberculosis in children with tuberculosis of the lung. According to one view the focus in the lung is the primary focus, the tuberculosis of the neighbouring peribronchial lymphatic glands being secondary. The other view maintains that the infecting tubercle bacilli lodge first, so far as the lungs are concerned, in the lymphatic glands, spreading thence in a retrograde manner into the lung and setting up a pulmonary tuberculosis that is secondary. Much work has been done on the Continent to settle this point. A book was written about it by Dr. A. GHON of Prague in 1912, and this has now been translated into English by Dr. BARTY KING.[5] Here we have a full account of the *post-mortem* examination of the lungs and bronchial glands in 184 tuberculous Viennese infants and children. In 170 of these there was a primary focus in the lung, as Dr. Ghon's analysis shows; in 14 no focus could be detected in the lung. The final conclusion reached is that the lung was the primary focus of infection in 162 cases, and in 15 more another organ besides the lung came under the category of channel of infection; in 3 the small intestine, in 1 the right tonsil, in 1 apparently the skin was the primary focus, and in only 2 cases could no channel of infection be recognized. Good reasons exist for believing that in the young the lungs are infected with tuberculosis by inhalation, and not by the blood stream or lymphatic channels. In childhood, therefore—at any rate, so far as the city of Vienna is concerned—a primary infection of the lungs represents the usual form of tuberculous infection. The translator has done his work adequately, although such diagnoses as "meningitis Weichselbaum" (p. 52) and "pseudo-membranous angina" (p. 17) smack more of the German than the British tongue. The book should be read by pathologists and those who are especially interested in tuberculosis.

NOTES ON BOOKS.

Whitaker's Almanack[6] for 1916, the forty-eighth annual volume, appears with an apology from the editor for its later publication, the delay being due, it is stated, largely to causes arising out of the war, including difficulties in the various departments of production. The general arrangement and scope of the volume has not been changed, but the navy and army lists have been curtailed owing to the scantiness of official information. On the other hand, there are two articles on the war—the one a diary bringing matters down to the end of October, 1915, and the other a consecutive history of the military and naval operations. There are several articles on national finance, including particulars of the war budget and taxes, and a table showing the amount of tax payable on incomes of various amounts. There is a useful note on trading with the enemy, and the duties of the Public Trustee in respect of enemy property. There is also a short article on the national dye scheme which, if successful, may eventually have considerable influence on the price of synthetic drugs. Altogether the volume for this year has been brought well up to date, and is a no less indispensable desk companion than the previous issues.

The ninth edition of Drs. WARWICK and TUNSTALL'S *First Aid to the Injured and Sick*,[7] an advanced ambulance handbook, comes two years after the eight edition. It is accompanied by a set of questions whereby the success with which the learner has perused it can be tested. The book is one of proved utility and excellence, written in concise style, full of useful information. The authors might with advantage recast the account of "Shock by Electricity," given on p. 163, emphasizing the importance of immediate recourse to artificial respiration in such cases, and the necessity for continuing therewith until either the patient has recovered or it is certain that death has taken place.

The thirteenth volume of the *Laboratory Reports of the Edinburgh Royal College of Physicians*,[8] edited by Drs. GRAHAM BROWN and JAMES RITCHIE, contains thirty-two papers by eighteen authors. They deal with subjects in protozoology, anatomy, biological chemistry, pathology, and bacteriology, and include four articles that first appeared in the BRITISH MEDICAL JOURNAL during 1913 and 1914. Nothing could furnish more satisfactory evidence of the vitality of the study of medical science in Edinburgh than is afforded by the publication of this interesting and well-filled volume. Many of the articles are of the first importance, from a practical as well as a scientific point of view, and none fall below a high level of excellence. It is gratifying to find that even in the present time of stress the study of pure science is not being neglected.

Volume xlii of *St. Thomas's Hospital Reports*[9] deals with the cases admitted during the year 1913. Its contents are divided into eleven sections, and these deal in a summary or statistical manner with the activities of the various hospital departments among both out-patients and in-patients. These reports should be of particular interest to St. Thomas's men, and are of value as showing the proportions in which the various surgical, medical, and gynaecological disorders come up for treatment in a great London hospital at the present time.

It is to be regretted, perhaps, that statistics do not always command the respect that is their due. The man in the street is apt to connect them in his mind with the paradox, "lies, d——d lies, and statistics"; the French have defined them as *le mensonge en chiffres*. As a corrective to such injustices as these may be mentioned a recent monograph on *Mortality Laws and Statistics*,[10] in which the mathematical treatment of the subject is thoroughly expounded. To any one familiar with the employment of logarithms and disintegration, functions and summation, the volume should be of no little service; to less accomplished mathematicians it will remain a sealed book.

In his brief account of *Catalysis and its Industrial Applications*,[11] reprinted from the *Chemical World*, Mr. JOBLING gives an account of the chief of the many uses to which catalysts are put in chemical industry. The book is highly interesting reading, but demands a certain amount of chemical knowledge for its due appreciation. The notion of catalysis was introduced into chemistry by Berzelius as long ago as 1835; an exact definition of what is meant

[4] *The Practitioner's Encyclopaedia of Medicine and Surgery in all their Branches.* Edited by J. Keogh Murphy, M.C.Cantab., F.R.C.S. Second Edition. London: H. Frowde, and Hodder and Stoughton. 1913. (Sup. roy. 8vo, pp. 1469. 35s. net.)

[5] *The Primary Lung Focus of Tuberculosis in Children.* By Dr. A. Ghon; English authorized translation by D. Barty King, M.A., M.D.Edin., M.R.C.P.Lond. and Edin. London: J. and A. Churchill. 1916. (Roy. 8vo, pp. 196; 2 plates, 72 figures. 10s. 6d. net.)

[6] *Whitaker's Almanack.* London: 1916. Price. 2s. 6d. net.

[7] *First Aid to the Injured and Sick: An Advanced Ambulance Handbook.* By F. J. Warwick, B.A., M.B.Cantab., Major R.A.M.C.(T.), and A. C. Tunstall, M.D., C.M., F.R.C.S., Major R.A.M.C.(T.). Ninth edition, revised. Bristol: J. Wright and Sons, Limited. London: Simpkin, Marshall, Hamilton, Kent, and Co. 1915. (Fcap. 8vo, pp. 260; 300 figures. 1s. net.) *Questions on First Aid to the Injured and Sick.* (Fcap. 8vo, pp. 38. 6d.)

[8] *Reports from the Laboratory of the Royal College of Physicians, Edinburgh.* Edited by J. J. Graham Brown, M.D., and J. Ritchie, M.D. Edinburgh: Oliver and Boyd. 1915. (Roy. 8vo, illustrated.)

[9] *St. Thomas's Hospital Reports.* Vol. xlii. Edited by Dr. J. J. Perkins and Mr. C. A. Ballance. London: J. and A. Churchill. 1915. (Demy 8vo, pp. 258; 4 illustrations. 8s. 6d. net.)

[10] *Mortality Laws and Statistics.* By R. Henderson. No. 15, Mathematical Monographs, edited by M. Merriman and R. S. Woodward. First edition. New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd. 1915. (Med. 8vo, pp 114. 5s. 6d. net.)

[11] *Catalysis and its Industrial Application.* By E. Jobling, A.R.C.Sc., B.Sc., F.C.S. Textbooks of Chemical Research and Engineering. London: J. and A. Churchill. 1916. (Cr. 8vo, pp. 128; 11 figures. 2s. 6d. net.)

by the term is no longer possible, owing to the multiplicity and variety of the catalytic reactions known and employed nowadays. A well-known definition of a catalytic agent or catalyst states that it is "a material which affects the velocity of a chemical reaction without appearing in the final products." The drying of oil paints may be quoted as a catalytic process familiar to all. Mr. Jobling writes clearly so far as the obscurity of his subject admits, and covers a great deal of ground in his excellent little book.

It would not be easy to find a more striking instance of the power of science to unravel the complexities and to illuminate the obscurities of Nature than is supplied by Mr. COULTER'S account of our present knowledge of *The Evolution of Sex in Plants*.[12] The subject abounds with traps for the unwary, and, until quite recently, botanists, misled by the superficial resemblance of the processes of reproduction among plants and animals, have been lending authority to popular misinterpretations which are now being abandoned. The key of the situation is to be found in the proclivity of plant life to an alternation of sexual and asexual generations, so that there are two kinds of individuals in a life cycle—the sporophyte producing spores but not gametes, and the gametophyte producing gametes but not spores. The gametophyte or sexual plant, which began in the thallophytes near the foot of the evolutionary ladder, has in the seed plants disappeared from ordinary observation, and become a dependent internal parasite of the asexual individual or sporophyte. The evolution of the sporophyte is the reverse. It appears among the cryophytes as an inconspicuous dependent upon the gametophyte; among the seed plants it is the only individual seen. Hence the stamens and pistils of a flower contain "the spores that in germination produce male and female gametophytes." They themselves are products of the asexual spore-producing plant which has monopolized the vegetative functions of the species. Low down in the scale, among the algae, we find individuals giving off cells which on division form ciliated spores of various sizes; the largest germinate independently and form new individuals, while the smallest usually, though not invariably, pair before germination. Here, then, we have both spores and gametes produced side by side from the same individual, indistinguishable except by size and behaviour, and the history of reproduction in plants is largely that of the gradual working out of a blend of the two modes of reproduction. Mr. Coulter tells his story in a fashion which holds the reader's interest. On the part played by nutrition, environment, and metabolism in the sexual sphere he has views of his own well worthy of attention.

[12] *The Evolution of Sex in Plants.* By J. M. Coulter, Head of the Department of Botany, the University of Chicago. The University of Chicago Science Series. Chicago: The University of Chicago Press; Cambridge: The University Press. 1915. (Cr. 8vo, pp. 140; 46 figures. 4s. net.)

HYPOCHLOROUS ACID IN SURGERY.

AT the request of the Medical Research Committee an investigation on antiseptics was undertaken in the department of pathology of the University of Edinburgh in January, 1915. Comparison of the different types of antiseptics led to a general conclusion embodied in the paper entitled "Experimental observations on the antiseptic action of hypochlorous acid and its application to wound treatment," published in this JOURNAL, by Drs. Lorrain Smith, Murray Drennan, Rettie, and Campbell, on July 24th, 1915, p. 129. The name "eupad" was given to the powder and that of "eusol" to the solution. At that date a considerable amount of surgical experience on the subject had already accumulated, but at a meeting summoned by the president of the Royal College of Surgeons of Edinburgh on August 10th, it was resolved to institute a more extended clinical investigation by the combined action of a number of surgeons in Edinburgh. A report by this committee has now been presented to the Medical Research Committee, and will be published, we are informed, in full in the *Journal of the Royal Army Medical Corps*.

The report points out that solutions of alkaline hypochlorites have long been used as antiseptics, but that solutions of hypochlorous acid have not been generally employed, although there is evidence that the chlorine water of the old *British Pharmacopoeia* owed its antiseptic power to the presence of hypochlorous acid in solution. The experience related in this report and that of other surgeons show that hypochlorous acid can be applied in the treatment of septic wounds to an extent hitherto unsuspected. This general conclusion, it is pointed out, is confirmed by observers who have worked with dilute solutions of sodium hypochlorite.[1]

The report contains notes on 257 cases; 199 were civil cases and the remainder military; the cases were selected to show the applicability of the method to the treatment of wounds, both recent and those in which sepsis had been established for at least a week, and in some cases for months. Of the civil cases 100 were treated in the out-patient department of the Royal Infirmary by Mr. J. M. Graham and Mr. Jardine. They consisted of lacerated and contused wounds, cuts, septic ulcers, abscesses, whitlow, etc. Upon these cases the following observations are made;

Of these, 67 never showed sepsis; 23 were septic when they were admitted to the department; 10 became septic after treatment, but experience showed that the cause of this was insufficiency in the application of eusol—for example, one dry dressing in twenty-four to seventy-two hours.

Special note was made in 10 cases in which an experimental first field dressing was applied with the view of testing its power of preventing sepsis. It consisted of a pad of gauze, in the centre of which were placed 2 grams of dry eupad. The powder was moistened by fluid discharge from the wound, or where the wound was dry a little water was poured on the dressing. It was covered only by the bandage. The purpose was to test the disinfecting power of the hypochlorous acid gas given off from the moistened eupad.

This treatment was completely successful except in three cases. In one of these the patient returned after twenty-four hours, when the wound was found clean and a eusol dry dressing was applied. The patient then absented himself for seven days, and at the end of this period he returned with the wound septic.

In the second case, a contusion of the scalp in a child 5 years of age, the wound remained clean for three days. It was then being treated with a dry dressing of eusol; this was insufficient to prevent the onset of sepsis, but it was cured by eusol soaks.

In the third case the wound became infected because the patient removed the dressing.

This subject deserves further investigation, but it can be adequately dealt with only in the field—for example, by the regimental medical staff or the field ambulance medical officers.

The military cases comprised superficial wounds, deep flesh wounds, fractures, and injuries to bone, including necrosis, and septic synovitis.

The wounds were all septic when the patients reached the hospitals. Except in a few cases of recent accidental wounds, the interval between the receipt of the wound and entry to hospital varied from one to three weeks; in many cases the interval was longer, treatment having already been carried out in another hospital.

GENERAL CONCLUSION.

The following are the conclusions drawn by the Committee:

"Further clinical experience of eusol in a great variety of cases has proved it to be a non-toxic, non-irritating, and efficient antiseptic.

"Nothing in this experience has been more striking than the fact that while it is highly destructive to bacteria, it is non-toxic to the tissues. In eusol free hypochlorous acid is the most essential ingredient, but there is present also a sufficient quantity of biborate of calcium to give the solution a reaction alkaline to litmus. This feebly alkaline solution can be introduced into wounds or serous cavities with perfect safety. It can even be left in such cavities in quantity without any harmful effect. In lacerated and contused wounds, and in compound fractures such as are met with in military practice, it is the most efficient antiseptic we possess.

"It is most efficacious during the period of what might be termed progressive sepsis. Some surgeons have emphasized the benefit of modifying the treatment when sepsis is subsiding or has ceased. The granulations form after a period of two to three days, and rapidly cover the surface of the wound. Any tendency to superabundant growth of granulations, and consequent delay in healing, can be counteracted either by so applying the eusol that the serous discharge is reduced to a minimum and the wound is kept dry, or by discontinuing eusol and using other dressings appropriate for healing wounds. In any event the sepsis is by this stage completely under control.

"The freedom which can be exercised in the application

[1] Dakin, BRITISH MEDICAL JOURNAL, 1915, vol. ii, p. 318; Bowlby, ibid., p. 921.

of eusol, and the rapid action which it has in arresting the sepsis and discharge of an infected wound, led to experiments on the effect of eusol on the blood. Following on this, eusol was employed in the treatment of general septic toxaemia by intravenous injection.

"This method was first made use of by Lorrain Smith, Ritchie, and Rettie,[2] in a case of grave puerperal septicaemia, and the result was the recovery of the patient. They have applied the treatment in other similar conditions. In several cases toxaemia has been successfully overcome, and although such a result has not been uniformly attained, the safety of the method justifies its being applied in the diseases referred to in their preliminary communication. Intravenous injection has also been applied with success by Captain Fraser and Captain Bates in cases of acute toxaemia secondary to gas gangrene.[3]

"Further research is now being carried out on the development of the subject foreshadowed by these investigations."

Some Practical Considerations.

Some practical considerations are developed in an appendix, which is as follows:

"Hypochlorous acid is an extremely active bleaching agent, and it should therefore not be brought into contact with coloured fabrics. Further, if cloth is kept in the solution for some time, its fibres are made brittle from destruction of the texture. Any towels, etc., which become wetted by the lotion should be forthwith rinsed in a large quantity of water to remove the acid as rapidly as may be. It also is corrosive to metals: instruments, needles, etc., should be carefully treated, else they will rust.

"The lotion is exceedingly inexpensive. The ingredients are procurable everywhere at a slight cost, and the preparation is a very simple process. At the present time especially it will be found that the introduction of eusol will effect economy in the outlay for the treatment of septic wounds—a point of considerable importance since phenol and its derivatives are becoming increasingly difficult to procure.

"Finally, it may be useful to set forth the details for preparing the antiseptic:

"Eupad powder is composed of equal weights of boric acid and bleaching powder. The boric acid is in sufficient excess to set free the hypochlorous acid in the solution. The bleaching powder should be dry and should contain 28 to 30 per cent. available chlorine.

"The solution eusol is prepared as follows: Add to 1 litre of water 25 grams of the powder; shake well; allow it to stand an hour; filter. The clear solution is eusol and contains about 5 per cent. hypochlorous acid. If the bleaching powder is old or not up to the strength given above, use a larger quantity of the powder. A rough and ready method of preparation is to add ½ oz. of the mixed powder to 1 pint of water, stir or shake, and allow the sediment to settle. In cold weather the solution will keep its strength for three weeks. In hot summer weather it loses its strength more rapidly and should not be kept more than one week. It keeps best in bottles of coloured glass in a dark cupboard.

"For use as a lotion the solution must be warmed. This may be done by placing the bottle in a basin of hot water, or the solution may be made double strength (50 grams to the litre) and diluted with an equal volume of hot water. The double strength solution will not keep its value for more than two days."

ROYAL MEDICAL BENEVOLENT FUND.

(Concluded from page 134.)

THE following is a continuation of the summary of cases relieved by the Committee at its meeting on December 14th, 1915:

L.R.C.P.Edin., aged 58, who practised at Old Kirkpatrick, N.B. Is suffering from spastic paralysis. Lives with a sister who has to earn a living by taking in boarders. Only income is that given by the Fund. Has one son, aged 19, who is studying for a dentist, and his fees being paid by the Fund and Guild. Relieved eleven times, £132. Voted £12 in twelve instalments.

Widow, aged 56, of L.S.A.Lond. who practised at Islington and died in 1905. Applicant was left with two sons, who helped to keep her. The elder one, however, died in March, 1915, and the other joined the army, and has been missing since April, 1915. She is now keeping house for two young nephews. Relieved eight times, £128. Voted £18 in twelve instalments.

Daughter, aged 47, of M.D.Edin. who practised at Southampton and died in 1886. Applicant's only income is £25 per annum from a charity and friends; she is suffering from chronic neuritis and quite unable to continue her work as a nurse. Relieved twice, £14. Voted £12 in twelve instalments.

Daughter, aged 71, of M.D.Edin. who practised in Somersetshire. Applicant lost all her income through unfortunate investments. Used to earn a little by painting, but cannot obtain any commissions at present. Relieved three times, £42. Voted £3, and referred to the Guild for report.

Widow, aged 66, of L.R.C.P.Edin. who practised at Port Carlisle and died in 1893. Applicant was left quite unprovided for, with five children, none of whom are able to help. Has recently had breast removed for cancer, and otherwise health very bad. Elected to annuity of £10 by another charity this year. Relieved twice, £24. Voted £12 in twelve instalments.

Widow, aged 60, of M.R.C.S.Eng. who practised in Liverpool and died in 1895. Applicant is a trained nurse, but in consequence of ill health is not always able to work. Relieved six times, £42. Voted £12 in twelve instalments.

Daughter, aged 57, of M.R.C.S.Eng. who practised at Hammersmith and died in 1908. Owing to ill health the applicant is unable to obtain employment. Has no income, but receives occasional gifts of clothes and food from friends and help from the Guild. Relieved eight times, £104. Voted £18 in twelve instalments.

Widow, aged 54, of M.R.C.S.Eng. who practised in Wiltshire and Devonshire and died in 1914. Applicant was left unprovided for at husband's death, who was an annuitant of the Fund. Receives a little help from friends, but not sufficient to keep her, and unable to obtain suitable work. Relieved three times, £16. Voted £12 in twelve instalments.

Widow, aged 56, of L.S.A.Lond. who practised at Limehouse, E., and died in 1914. Applicant was left unprovided for, with two daughters now aged 21 and 23 years, but neither living with their mother, or able to help much. Applicant's health very indifferent, and only able to earn a little by needlework. Relieved ten times, £58. Voted £12 in twelve instalments.

Widow, aged 48, of M.R.C.S.Eng. who practised at Hexham and London and died in 1908. Applicant dependent on boarders, which is very precarious, and what she can obtain by needlework. Has four stepchildren and one daughter of her own who lives with her, but earns very little in consequence of bad sight. Relieved six times, £72. Voted £12 in twelve instalments, and referred to the Guild.

Daughter, aged 69, of M.R.C.S.Eng. who practised at Cheltenham and died in 1879. Applicant's health is very bad, suffering from rheumatism and defective sight. Only income two small annuities, and not quite sufficient to live upon. Relieved twice, £24. Voted £12 in twelve instalments.

Widow, aged 61, of L.R.C.P.Edin. who practised in Dublin and died in 1900. Was left unprovided for, but was helped a little by son, who has recently died; also earns a little by needlework. Health now very indifferent. Relieved three times, £30. Voted £10 in two instalments.

Daughter, aged 69, of M.R.C.S.Eng. who practised in London and died in 1875. For forty years earned her living as a governess, mainly abroad, and for the last ten years in Russia. Her life savings were in a bank in Berlin, and she has not been able to obtain any of them. Has recently been able to earn a little by sewing, but not enough to live upon. Relieved once, £12. Voted £12 in twelve instalments, and referred to the Guild.

Daughter, aged 60, of M.R.C.S.Eng. who practised in London, and died in 1877. Applicant's only certain income a small pension from another charity. Before the war she earned a little by teaching music. Health has been very unsatisfactory of late. Relieved once, £10. Voted £10.

The claims on the fund show a constant increase month by month. At the last meeting the Committee had a record number of applications, and only a balance of £42 to meet them with. Grants were made to the extent of £448. To meet this deficit the reserves, which had already been reduced by £500, will have to be further drawn upon. Unless further support is quickly forthcoming, the Committee will have no choice but to restrict its operations, and that in the face of ever-growing claims. Subscriptions may be sent to Dr. Samuel West, the Honorary Treasurer, at 11, Chandos Street, Cavendish Square, London, W.

The Royal Medical Benevolent Fund Guild appeals for gifts of secondhand clothing, boots, and shoes in good condition, also household linen. The gifts should be sent to the Secretary, Royal Medical Benevolent Fund Guild, 43, Bolsover Street, W.

[2] BRITISH MEDICAL JOURNAL, November 13th, 1915.
[3] BRITISH MEDICAL JOURNAL, January 15th, 1916.

THE Eugenics Record Office, which has its head quarters at Cold Spring Harbor, Long Island, New York, has begun the issue of a bimonthly bulletin, entitled *Eugenical News*, to report its work. It has trained a number of persons engaged in social and eugenical research, and the investigation of family histories is conducted under its direction by a number of other agencies.

British Medical Journal.

SATURDAY, JANUARY 29TH, 1916.

DAYLIGHT TREATMENT.

M. DASTRE proposed some time ago to apply the term "biotic" to the action of light on living tissues, and the word seems convenient. The effect of sunlight on plants is one of the commonest observations in nature, as is also the fact that diffused sunlight may be more wholesome for them than direct. It is possible to have too much of a good thing. In a vague way it has been recognized that sunlight might be good for animals also. Lately we have heard a good deal about the therapeutic effect of sunlight and arc and incandescent lamps; wonderful powers have been attributed to the ultra-violet rays, and the *x* rays have been shown to possess great virtue, so that as heat, general or local, is perhaps the oldest of all prophylactic and curative agencies, we are now using rays all the length of the spectrum, though below the ultra-violet there is a long gap, as to which, indeed, even the physicists know very little. Physiologically in both plants and animals light probably exerts its action wholly or mainly through the natural pigments chlorophyl or haemoglobin, green being almost as absorbent, and red only a little less absorbent, than black. The effects observed may be due either to direct absorption of energy, or to an excitation effect on the protoplasm. Sunlight, and ultra-violet rays unfiltered or having only undergone a small amount of filtration, are fatal to bacteria, but so thin a layer protects them that even direct sunlight ceases to be lethal when it has to travel through only 1 mm. of the tissues.

Dr. Miramond de Laroquette reported recently to the Académie de Médecine in Paris[1] the results of a long series of observations carried out from 1910 to 1914 on animals and plants in conservatories with coloured glasses. His general conclusion is that the biotic action of light is not due exclusively, or even principally, to what are commonly called the chemical rays. He found that in spite of the fact that the chemical effect of blue light is nearly equal to that of white light, blue has very slight biotic effect, much less than yellow and a little less than red. All parts of the solar spectrum, the infra-red light and the ultra-violet, appeared to benefit plants, but the most active was light, and of the light rays the most active was yellow, which has little chemical action, but is highly illuminating and heating. Long exposure to strong sunlight has an irritating effect on tissues, and produces erythema in man; if intense and prolonged it may cause dehydration and coagulation of the protoplasm of cells, and there is reason to conclude that these effects are mainly due to the chemical rays. The bactericidal action of light is only to be observed when the bacteria are in layers very thin or easily dried. Cultivations of the colon and paratyphoid bacilli, and of streptococci and staphylococci in liquid mediums resisted long and strong irradiation; some lived in Dr. Laroquette's conservatories for as long as six months, even when under ordinary white colourless glass, which only cuts off a very small part of the ultra-violet. If more than 1 mm. deep in the tissues, bacteria are protected, for irradiation strong enough to kill them destroys the cells also. Dr. Laroquette concludes that any therapeutic results are primarily biotic, and that any destruction of bacteria is secondary, due to the stimulation of the defensive powers of the tissues.

Nevertheless he is a strong advocate of treatment of the wounded by daylight; after exposure for a few days to sunlight suppuration diminishes, wounds assume a healthy aspect, and cicatrization proceeds rapidly. That the treatment is not more generally adopted is due, he thinks, to certain misapprehensions. One mistake made is to expose patients to direct sunlight over too large a surface and for too long a time. Another mistake is to suppose that direct sunlight is necessary at all. He argues that it is not, and asserts that a large number of experiments and clinical observations have convinced him that light filtered through ordinary window glass does not lose its biotic powers, that it may still irritate the tissues, and also exercise some part of the small bactericidal power possessed by the unfiltered sunlight. He holds that exposure to diffused light, though it acts less rapidly, is not less effective if sufficiently prolonged. The light treatment of wounds should, he considers, be carried out in large, well-ventilated conservatories, with walls and roofs of ordinary glass. The temperature should be maintained at about 27° C. (80° F.), and at that temperature large surfaces of the body can be exposed without inconvenience. The light can be regulated by screens or blinds, as in a photographer's studio, or if the sun is shining brightly, by yellow screens. When the light is bad it can be concentrated on the wounds by reflectors or lenses. Dr. Laroquette declares that the results he got at the Maillot Hospital, Algiers, among the wounded from Morocco in 1912 to 1914 were most satisfactory, and that many surgeons who, during last summer, used heliotherapy in France are convinced of its efficacy.

As there seem still to be many who are sceptical as to the injurious effect of direct sunlight when a large surface of the body is exposed to it, we may take the opportunity of mentioning a paper by C. Römer,[2] in which he condemns his countrymen for their indiscriminate resort, especially when suffering from nervous debility, to sun baths. The public, he says, use them irrationally and immoderately, owing to the growth of a superstition that the sun possesses the primary sources of healing for every evil. In special sun and air institutions in every large town persons of every age and with every kind of disease expose themselves by the hour to the direct rays of the sun. To one such institute in Hamburg as many as 18,000 may go on a Sunday in the summer. The chief results of the exposure of the whole body to the sun are a rise of temperature and increase in metabolism. Though in small doses and under certain conditions this treatment may, he thinks, possibly be beneficial, yet, indulged in as a fad, it is harmful, particularly for the subjects of nervous instability. Its devotees are mainly recruited from among the tired, flabby, anaemic workers in offices and factories, where the day is spent in dark and unhealthy surroundings. To make up for these drawbacks, the workers take overdoses of sunlight when they can, with the result that they become exhausted, irritable, sleepless, and unfit for work. Not infrequently by the end of the summer they have to go into hospital. Römer mentions the case of one lad, aged 16, who had indulged in a sun bath on July 19th for several hours without any covering to his head. Afterwards he suffered from

[1] *Bull.*, T. lxxiv, p. 549.

[2] *Deut. med. Woch.*, July 8th, 1915.

severe headache; on admission to hospital on July 24th, he showed nothing abnormal, apart from marked pigmentation and irritation of the skin. There was no fever or cervical rigidity, and the pulse was slow. Lumbar puncture, which yielded clear, sterile fluid under a pressure of 320 mm. of water, was instantly followed by cessation of the headache, and the patient was discharged on July 28th perfectly well. In another case a lad, aged 16, had spent the whole day of July 12th in the sun without any covering to the head. The headache which followed still persisted on July 20th, when he was admitted to hospital with the diagnosis of meningitis. The temperature was 38° C., and the pulse was soft and rapid; Kernig's sign was positive, and cervical rigidity was demonstrable. There was no mental disturbance, and examination of the eyes and urine was negative. Lumbar puncture yielded clear, sterile fluid under a pressure of 280 mm. of water. The pain diminished at once, and next day the fever, cervical rigidity, and Kernig's sign had disappeared. On July 23rd the pressure of the cerebro-spinal fluid had fallen to 150, and on July 27th to 110 mm. of water.

CEREBRO-SPINAL FEVER.

A NUMBER of interesting conclusions are reached by the authors[1] of a recent paper on 161 cases of cerebro-spinal fever treated during 1915 at a hospital located, apparently, somewhere in France. Dealing first with the problem of carriers of the meningococcus, they argue that the spread of the infection is not necessarily caused by the immediate contacts. They do not think that the disease can properly be called contagious, because no case occurred and no carriers were found among the nurses, nursing orderlies, or medical officers in attendance on the patients, though quite a number of carriers were detected among units in the field. The diagnosis is often difficult early in the disease, except in the very acute cases. Cerebro-spinal fever is differentiated from influenza by the relatively slow pulse of high tension, the frequent hyperaemia of the ciliary region of the sclerotic, the dry and dirty tongue, the high leucocytosis, and generally also by the changes in the cerebro-spinal fluid, that characterize cerebro-spinal fever. In enteric fever the onset is less abrupt, there is a leucopenia, and the evidence obtained by lumbar puncture is conclusive. In two cases acute mania closely simulated cerebro-spinal fever; the diagnosis here was made by lumbar puncture. In fact, the authors lay great stress on lumbar puncture in the diagnosis of cerebro-spinal fever; it was performed in 160 cases, and showed the presence of many polymorphonuclear leucocytes in the fluid withdrawn in every case, with intracellular diplococci in 117 instances; both small and large lymphocytes were also increased in every instance. The occurrence of ocular signs and symptoms—such as blepharitis, purulent conjunctivitis, keratitis, optic neuritis, ptosis, squint, and nystagmus—is said to be of bad prognostic import, as is also loss of control over the sphincters if it is more than transient. Among the complications noted were acute nephritis in nine cases, suppurative arthritis of the knee in two patients (cured by repeated aspiration), hyperpyrexia in two fatal cases, and acute or chronic hydrocephalus was seen very frequently. As for treatment, the patients were nursed in a large and airy ward, and were put out on a balcony in the open air whenever possible. Frequent lumbar puncture after the administration of a little pure chloroform was the main line of treatment. This was repeated daily for four or five days, and then every second day for about a week unless the patient was convalescent, when the puncture was discontinued, or seriously ill, when it was repeated daily. With this treatment alone 21 out of 43 patients died. Other patients received this treatment combined with vaccine or serum treatment; except in the case of the living vaccine (29 cases, 13 deaths) the mortality here was higher. This uniformly high mortality is ascribed to the fact that many of the patients did not come under treatment till the fifth or even the eighth day of the disease. In four cases trephining for decompression was performed, in one with a successful result. One patient recovered after the fever had lasted 141 days, and another after 96 days of pyrexia. One patient—a young woman who had been visiting her husband lying ill with meningitis for some weeks—had a hysterical attack closely simulating cerebro-spinal meningitis, with headache, a temperature of 101° F. and a pulse of 68, retraction of the head and stiffness of the neck, photophobia, erythematous blotches on the abdomen, ankle clonus and exaggerated knee-jerks, a flexor plantar response, and a doubtful Kernig's sign. Lumbar puncture was performed thrice, and yielded a normal cerebro-spinal fluid on each occasion. Recovery was rapid. The authors remark that no satisfactory method for the speedy isolation or differentiation of the meningococcus has yet been devised, a fact that should not be overlooked when the diagnosis of carriers of the meningococcus is being considered with a view to checking the spread of the disease.

A novel aspect of its etiology is introduced by Dr. Hort, in a paper printed on another page of this issue. He does not believe that Weichselbaum's meningococcus is the causal agent of cerebro-spinal fever. His experiments lead him to think that the true infecting agent is a very minute organism capable of passage through the pores of a Chamberland F filter; he holds that the meningococcus itself is incapable of reproducing the disease, but is constantly associated with this filterable virus that does cause it, and has hitherto been overlooked by investigators of the pathogenesis of this form of meningitis. That some connexion exists between the new virus and the old meningococcus with which we are all familiar seems a natural conclusion. Possibly, as Dr. Hort suggests, the two are but different phases in the life-history of a single causal micro-organism. The point is one that can safely be left to the future for elucidation. Dr. Hort's paper and his views on the etiology of cerebro-spinal meningitis will be read by bacteriologists with interest, if not, perhaps, with immediate acquiescence and approval. The many points he deals with are naturally in need of further investigation and confirmation, on the lines pointed out by himself, before they can expect to command general acceptance.

[1] Lieutenant-Colonel E. A. Bourke, Captain R. G. Abrahams, and Major S. Rowland: *Journal of the Royal Army Medical Corps.* London. 1915, xxv, 633.

THE INSURANCE COMMISSIONERS AND MEDICAL RECRUITING.

THE circular issued by the Insurance Commissioners for England and Wales to Insurance Committees with regard to medical recruiting (see SUPPLEMENT, January 8th, p. 5) is being construed, it would appear, by some Insurance Committees in such a literal way that there is a danger that quite unnecessary obstacles may be put in the way of panel practitioners joining the army. Though the Commissioners expressed their anxiety that nothing of the sort should

occur, their circular, we fear it must be admitted, lends itself to the interpretation that the convenience of the insured population must at present take preference over the requirements of the army so far as medical service is concerned. That this interpretation has been put on it by more than one Insurance Committee appears from their acts, and the work of obtaining medical recruits by the medical war committees, which was already hampered quite enough by the private difficulties of practitioners, will be made far more difficult if all the suggestions of the Commissioners are to be carried out in the literal spirit which these committees show. The Commissioners reminded Insurance Committees that the panel doctors are under contractual liabilities, and a hint is given that for the present, at all events, the contracts must be strictly enforced. An example showing the interpretation which may be put on the circular is afforded by a letter addressed by the Insurance Committee of the County of Middlesex to the panel practitioners of its area. The Committee seems to agree with Mr. Lambert, M.P., who "does not see that the war makes any difference." It asks the recipient to "remember that your agreement provides that all treatment shall be given by you personally, except where you are prevented by urgency of other professional duties, temporary absence from home, or other reasonable cause, and that you will to the best of your ability provide that when you are so prevented some other practitioner will give attendance as deputy on your behalf." After this the Committee goes on to say that "before releasing a practitioner for military service it must be satisfied (1) that there is no likelihood that the absence of the doctor in question will render the panel service no longer efficient, either generally or in any particular locality, due regard being had to the seasonal variation of sickness incidence; and (2) that satisfactory arrangements are made for carrying out the absentee's duties."

It is not too much to say that in all probability the mere mention of these guarantees will already have deterred more than one panel practitioner from offering his services to the army, and if the terms of the letter are enforced in their obvious sense it will put almost insuperable difficulties in the way of the medical war committee or committees for the Middlesex area.

Practitioners throughout the country have made the best arrangements they could to safeguard the practices of those practitioners who are absent on war service. This was entirely an act of free will. As a general rule the arrangements involve that the practitioners who remain at home should undertake to do a vast amount of additional work for half the ordinary fees, the other half going to the absentees. So long as this was a purely voluntary arrangement it would have worked well, but now the Commissioners make a pronouncement which is interpreted to mean that Insurance Committees are set up as judges as to whether these voluntary arrangements are satisfactory. In other words, since it is practically impossible at present on any large scale to obtain locumtenents, Insurance Committees, believing that they are acting in accordance with the instructions of the Insurance Commissioners, are, by demanding the stringent guarantees mentioned above from any panel practitioner who would be willing to join the army, not only appropriating as a right what was intended as an act of grace, but are assuming a right to criticize a free gift. If the Commissioners had stopped at suggesting friendly conferences between local medical war committees, panel committees, and insurance committees, there is little doubt that efficient arrangements for continuing to provide an adequate medical service for the insured would have been made; but when they go further and suggest measures which can be interpreted as justifying the blunt letter of the Middlesex Insurance Committee, reminding panel practitioners that they must carry out their contract to the letter, and demanding that a would-be recruit must give guarantees against such contingencies as seasonal variation of sickness incidence, they are, no doubt unwittingly, putting serious hindrances in the way of medical recruiting and unnecessarily hampering the work of the medical war committees.

It might have been supposed that, having seen the hideous iniquities to which it has led, the exponents of State socialism would have been ready to show some degree of modesty in using the letter of the law to enforce their doctrines on an unwilling people. It seems that this was too sanguine an expectation. To them we commend the perusal and reperusal of the book by the Right Hon. J. M. Robertson reviewed in another column. They can hardly flatter themselves that he is a prejudiced witness.

INTRAVENOUS INJECTION OF HYPOCHLOROUS ACID IN THE TREATMENT OF TOXAEMIA.

THE four cases[1] in which the intravenous injection of hypochlorous acid in severe toxaemia has been followed by very remarkable improvement will direct attention to this method. It is important, therefore, to point out that among the problems which are raised by these investigations there is one which should receive the special attention of observers—namely, the composition of the solution which contains the antiseptic. The solution eusol contains several ingredients, the chief of which are hypochlorous acid and calcium biborate. According to the original statement of Lorrain Smith, Drennan, Rettie, and Campbell,[2] the solution of eusol contains hypochlorous acid 0.54 per cent. and calcium biborate 1.28 per cent., with a small quantity (0.17 per cent.) of calcium chloride. The hypochlorous acid is estimated by titration with N/10 arsenious acid. In virtue of the balance which is established in this solution the reaction is faintly alkaline, while the hypochlorous acid is to a large extent free. It has been shown by experiment that considerable quantities of this solution can be injected into the veins of normal animals with impunity. On the other hand, a solution of pure hypochlorous acid cannot be injected, as it coagulates the blood; nor can a dilute solution of sodium hypochlorite be injected, since it causes haemolysis.[3] Further investigations will show the extent to which the intravenous injection of eusol can be applied in the treatment of toxaemia in the human subject. It will be noted that in all the cases the solution actually injected was made up in normal saline. The solution employed by Captains Fraser and Bates consisted of eusol containing 0.5 per cent. of hypochlorous acid to which was added 8.5 grams of sodium chloride per litre and the solution was carefully standardized before injection. In two cases (C and D) the quantity injected intravenously was 40 c.cm.; in a third (E) 70 c.cm. In the case of puerperal fever reported by Lorrain Smith, Ritchie, and Rettie the quantity was 100 c.cm. of eusol made up in normal saline and the temperature 98.4° F. It appears that the rate of injection (10 c.cm. per minute) is an important point.

THE NEW LIGHTING RESTRICTIONS.

THE difficulties which it is feared the new lighting restrictions will create for medical motorists were brought to notice in the House of Commons by Mr. Perkins on

[1] Lorrain Smith, Ritchie, and Rettie, JOURNAL, November 13th, 1915, p. 715; Fraser and Bates, JOURNAL, January 15th, 1916, p. 85.
[2] JOURNAL, July 24th, 1915, p. 129.
[3] Dakin. BRITISH MEDICAL JOURNAL, August 28th, 1915, p. 319.

January 19th, when he asked whether, in view of the difficulties of medical men living in country districts who frequently had to drive themselves long distances after dark to visit patients, the desirability of exempting their cars from the new lighting order would be considered. The Home Secretary (Mr. Herbert Samuel), in his reply, expressed the opinion that the effect of the order had been misunderstood in some quarters. The use of headlights was prohibited in certain areas, but the limits of size and power for side-lights had been fixed so high as to allow a good driving light on country roads at night. The order, he added, was settled in consultation with expert motorists, and had been generally accepted. We understand that experiments have shown that if the side-lamps are placed above the mudguards and fairly well forward the lighting of the road is much improved; the Home Office takes no objection to this position so long as the lamps show the full width of the car. In its reply to the letter addressed to it by the British Medical Association on December 31st, 1915 (SUPPLEMENT, January 15th, p. 10), it pointed out that in some cases motorists might be unable to obtain the full illumination the new order allows with the lamps they already possess, but added that, on the whole, a better driving light was permitted under the new order than under the orders previously in force. The authorities lay great stress upon the necessity of so altering the side-lamps as to obtain from them the full amount of light allowed by the order, and it is said that much of the dissatisfaction shown by motorists in regard to the new restrictions will disappear if careful attention is given to this detail. Some of the manufacturers are selling at quite a cheap rate a fitting which allows oil lamps to be converted into acetylene lamps.

"THE CRIMES OF THE GERMAN ARMY."

THE special illustrated supplement of the *Field*, entitled, "The Crimes of the German Army" (1s.), will fulfil the high expectations of those who possess the supplement it published last February. France, her ambassador in this country tells in a letter of approval, desires that the truth should be universally known. That is all, and it is enough; not Raemaekers' green devil could devise any forms of cruel, cowardly, and bestial crime not committed by the Germans and their allies during the last eighteen months. The crimes are related in this publication from official documents compiled from the statements of survivors, and the official notices, or unguarded statements in diaries never meant to be published, of the criminals. These are some of the headings: "Crimes against women and children," "outrages against civilians," "burning, loot, and pillage," "massacres," "the use of civilians as screens," "killing or mutilating the wounded," "outrages on the Red Cross." It is well to have these deeds brought together in an accessible form, because already the Germans and their hirelings are beginning to deny them, not because they are not true, but because, according to a crazy apriorism, they cannot be true of a nation some of the members of which in the past have written beautiful music. The publication is copiously illustrated by photographs of destruction and cruelty, and of the wooden idols the Germans have erected, together with studio portraits of the gods in uniform. It contains also reproductions of pictures published in German newspapers, including a self-revealing drawing of the panic supposed to have occurred among the women and children on the quays (!) of Scarborough. It was a happy idea to scatter through the articles reproductions of the woodcuts of Holbein's "Dance of Death," engraved early in the sixteenth century. The historian of the future will give his verdict from the official documents, which are accumulating rapidly, but the appeal which Mr. T. A. Cook makes in his preface is to the people of to-day, that, whether belligerent or neutral, there shall be recalled to them the indisputable facts they have read piecemeal in the daily papers. The facts are damning, yet they are excused by German men of science such, to name only a few whose names are best known, as Emil von Behring (Marburg), V. Czerny (Heidelberg), W. Erb (Heidelberg), Ernst Haeckel (Jena), Gustav Schwalbe (Strassburg), Wilhelm Wundt (Leipzig), Rudolf Kobert (Rostock), and August Bier (Berlin).

PASSPORT DECLARATIONS.

THE proceedings taken against Dr. A. H. Vassie, of West Hampstead, to which we referred on p. 945 of our issue of December 25th, 1915, concluded at the Old Bailey on January 14th in his acquittal of the charge of making a false declaration for the purpose of enabling a person to obtain a passport. As is probably well known, the Foreign Office requires all applications for passports to be accompanied by a form of recommendation signed by a British subject to the effect that the applicant is to his "personal knowledge a fit and proper person to receive a passport." Apparently, on August 3rd, 1914, a patient whom Dr. Vassie had known for many years introduced his niece, with the request that the doctor should sign her recommendation for a passport. Dr. Vassie ascertained from her that she was anxious to go to Germany in order to nurse her mother, who, she said, was seriously ill, and after putting a series of questions, all of which were answered willingly and satisfactorily, Dr. Vassie signed the form of recommendation, and a passport was issued by the Foreign Office on the following day. In July of last year the woman was arrested on a charge under the defence of the realm regulations. Inquiries were made of Dr. Vassie, as the person who had recommended her for a passport, with the result that proceedings were taken against him. The question which had to be decided by the jury at the Old Bailey was, had Dr. Vassie any "personal knowledge" as to the fitness of the applicant to receive a passport? The jury found that he had, and, as we have already mentioned, acquitted the doctor. The case is of some little interest to members of the medical profession, many of whom must frequently be asked to sign recommendations for passports, and the question which at once arises is, what extent of personal knowledge must a man have before he signs such a recommendation? In Dr. Vassie's case the jury considered that his seeing the applicant and putting a series of questions was sufficient; and although the finding of a jury in one case is no authority affecting the decision of another, even if the facts are identical, yet it is probably safe to assume that ordinarily no jury would convict where such precautions had been taken. The question is, after all, rather one of ordinary care and diligence than of anything else. A person who signs a passport recommendation must realize that by so doing he is becoming a sort of guarantor for the applicant, and that he is enabling him or her to obtain a passport which he or she could not otherwise have. He must therefore satisfy himself, so far as he is able as an ordinarily careful and prudent man, that the applicant he proposes to recommend is a fit and proper person to receive a passport, and unless he is satisfied he should refuse to sign.

CREMATION IN THE UNITED STATES.

THE Cremation Association of America held its third annual meeting at Buffalo, New York, on August 26th and 27th, 1915, when Dr. Hugo Erichsen of Detroit, the President, delivered an address in which he said that cremation had received the formal approval of the American Medical and American Public Health Associations. He urged the adoption of a vigorous propaganda to enlist the practical sympathy of persons having weight in their respective communities, and suggested the raising of a fund for that purpose by means of legacies of 1 per cent. on the estates of deceased members. He called on the medical press of America to pay more attention to cremation, saying that as a physician he was deeply ashamed of the fact that they could

not point to a single medical periodical in the States that could compare in this respect with the BRITISH MEDICAL JOURNAL, which had championed incineration for years. The American Cremation Association had, he said, grown steadily. The growth in 1890–94, as compared with 1885–89, was 25 per cent.; in 1895–1900, 39 per cent.; in 1900–4, 44 per cent.; and in 1905–9, 63 per cent. Mr. S. Frank Balcom, of Indianapolis, said that before 1884 there had been but a score of incinerations in America. Between that year and 1888 Le Moyne's crematorium had been followed by structures in New York, Buffalo, Pittsburgh, Philadelphia, Detroit, Los Angeles, Cincinnati, and St. Louis. About that time cremation societies were formed, and a good many members of the medical profession became interested in the movement. A table of statistics, presented by Mr. Samson to the Indianapolis Convention, showed that eleven of the fifty-three crematories in the States were in California, and that about one-third of all incinerations in the States had been carried out in California. This had been due to what might be called expediency. Many persons who failed to regain their health in that State and died there were incinerated, and the ashes returned to their former homes. Mr. Balcom suggested the formation of an incorporated body of the Cremation Association of America, with a central office in Washington from which propagandist literature could be distributed. Certificates might be issued, good for incineration at any crematory in America, on payment of, say, from £10 to £50, the ashes to be deposited under perpetual care if desired in a national columbarium. A resolution endorsing a petition addressed by Dr. Stefan Ulbrich, a Roman Catholic physician of Reichenberg, Austria, to the Congregation of the Inquisition at Rome, was passed. That petition asked the Holy See to rescind the decrees forbidding incineration to members of that Church. These decrees were based on the premiss that cremation was a tenet of Freemasonry, but it was pointed out that cremation was not a dogma of the Masonic order. Copies of the resolution were sent to Archbishop John Bonzano, Apostolic Delegate to the United States. One of the most interesting communications made to the meeting was a paper by Mr. J. Franklin Meehan on the planting and care of crematory grounds. Dr. Erichsen was re-elected president, and he was also chosen to be a delegate of the association to the next International Cremation Congress, which is to meet "shortly after the war."

WINTER CLIMATE OF THE EASTERN MEDITERRANEAN.

IN his presidential address to the Royal Meteorological Society Major H. G. Lyon, F.R.S., said that the returns from the large number of meteorological stations which had been in operation during the last fifteen to twenty years gave much accurate and detailed information as to the conditions prevailing at different seasons of the year in the Eastern Mediterranean. The conditions vary from the true continental climate of the Balkans, with low winter temperatures and moderate rainfall at all seasons, to the Mediterranean climate of Southern Greece and the Levant, with a hot summer and a strongly-marked rainy season in winter, characters which prevail in a more intense form in Egypt. Major Lyon said that the temperature in the Balkan region in winter was frequently very low, descending often below zero Fahrenheit. Frost occurred often in inland Greece and occasionally throughout the Eastern Mediterranean. The most severe weather occurred when anticyclonic conditions with clear skies and light winds prevailed in the Balkans; the air then fell to a very low temperature, and as a result streamed off the highland down into the low-lying Aegean Sea as a strong, cold northerly wind, which often reached gale force. January was the coldest month, but February differed little from it, and the first marked departure from winter conditions occurred in March. During the winter months the waters of the Mediterranean were from 5° F. to 10° F. warmer than the coasts, where, therefore, the winter climate was much milder than inland, but in March the difference became very small and disappeared at many places as the land was growing rapidly warmer. In winter rainfall was heaviest on the western shores of Greece and Syria, and markedly less on the eastern coast. The Balkan rainfall had a maximum in November, and afterwards decreased slightly, but was not heavy at any time; rain fell during the passage of depressions from the Mediterranean, which passed from west to east, bringing cloudy mild weather, rain and strong winds. Rainfall decreased southward, and in lower Egypt the amount was insignificant. The normal air circulation of the Eastern Mediterranean was simple in its general outlines. Northerly winds blew over Greece and the Aegean Sea, becoming north-westerly in the Mediterranean and westerly on the Syrian Coast. In Egypt northerly winds prevailed. This arrangement, which followed from the mean distribution of pressure in winter, was, however, greatly modified by the frequent passage of depressions along the Mediterranean from west to east. Many passed over the Balkans to the Black Sea and Southern Russia, causing strong southerly gales in the Aegean Sea, with rain and mild, unsettled weather for two or three days. Others crossed Greece and the Aegean, where, as they were approaching, strong southerly winds blew, which usually veered to the north-west on the following day. Others, again, passed to the south of Greece, sometimes skirting the Egyptian coast, and caused south-westerly gales and stormy weather in the Eastern Mediterranean and Levant, and northerly winds in the Aegean Sea. Northerly winds, which caused rough sea in the Aegean Sea during the winter months, were more frequent than southerly winds in the proportion of 2.5 to 1; and since many of these northerly winds were due to cold air pouring down from the Balkans highlands, the northerly winds might continue for a week at a time, while southerly gales rarely lasted for more than two days, unless a second depression was closely following the first.

WE regret to announce the death, on January 25th, of Emeritus Professor John Wyllie. Dr. Wyllie was appointed professor of medicine in the University of Edinburgh in 1900, in succession to Sir Thomas Grainger Stewart, and retired owing to ill health in November, 1914. We hope to publish a biographical notice in an early issue.

THE Council of the British Medical Association, at its meeting on January 26th, the first held since July, 1915, expressed its approval of the work done by the Central Medical War Committee appointed at the instance of the Representative Meeting, 1915, and of the measures it had taken and was taking to organize the medical profession in England and Wales to do its share in meeting the demands of the army, while safeguarding the interests of the public and of individual members of the medical profession as fully as the exigencies of the supreme struggle in which the British Empire is engaged permit.

THE Financial Secretary to the Treasury (Mr. Montagu) informed a deputation representing the approved societies, on January 26th, that it had been decided to appoint an expert committee on the questions of the simplification and the finance of the Insurance Act.

THE *Muenchener medizinische Wochenschrift* states that the reports circulated recently as to the serious state of the health of the German Emperor were greatly exaggerated. It adds that the physical fatigue and intense mental anxiety the Emperor has undergone since the war began has rendered him less able to resist minor illnesses.

Medical Notes in Parliament.

Central Medical War Committee.

MR. LYNCH on January 20th asked the Prime Minister whether he would take steps "to reorganize and recall to normal action the Statutory Advisory Board of the Army Medical Services, that it may resume regular meetings in its consultative capacity with a view to aiding the Director-General to a better utilization of the skill and experience which has been offered by medical men to the War Office, and to a more appropriate distribution of medical aid both for meeting the necessities of the military situation and for the needs of the civilian population." Mr. Tennant, in his reply, after pointing out that the Advisory Board was not statutory, referred Mr. Lynch to the answer given to Mr. Shirley Benn on November 25th (BRITISH MEDICAL JOURNAL, December 4th, p. 832); and to his written reply to the same member on January 12th (published in full in the JOURNAL of January 22nd, p. 140), where the matter had been dealt with at great length. "I may, however," Mr. Tennant continued, "add that, thanks to the patriotism of the medical profession, there is no present anxiety regarding the supply of doctors for the army, and the action of the Central Medical War Committee, with which the Director-General of the Army Medical Service is in touch, will be to carefully guard the interests of the civil population in this matter, the claims of whom have not been and will not be disregarded."

Mr. Lynch also asked whether during the last three years £600 had been paid yearly to each paid member of the Army Medical Advisory Board, and whether, seeing that since the beginning of the war the Board had held no meetings, the advisability of eliminating this expense would be considered if the Government desired that no formal meetings of that Board should be held. Mr. Tennant again replied by referring to the answers he had given to Mr. Shirley Benn on November 22nd and 25th (JOURNAL, December 4th, 1915, p. 832).

The Military Service Bill.

The Committee stage of the Military Service (No. 2) Bill was concluded in the House of Commons on January 20th. After the clauses of the bill had been disposed of considerable discussion took place on the first schedule, which enumerated the exceptions from the obligation of unmarried men to serve. The persons mentioned in the schedule as finally adopted are—

Exceptions.

1. Men resident in Great Britain for the purpose only of their education or for some other special purpose.
2. Members of His Majesty's regular or reserve forces, or of the forces raised by the Government of His Majesty's Dominions, and members of the Territorial Force liable for foreign service or who are, in the opinion of the Army Council, not suited for foreign service.
3. Men serving in the Navy, or the Royal Marines, or who, though not serving in the Navy or Royal Marines, are recommended for exception by the Admiralty.
4. Men in holy orders or regular ministers of any religious denomination.
5. Men who have left or been discharged from the naval or military service of the Crown in consequence of disablement or ill health (including officers who have ceased to hold a commission in consequence of disablement or ill health), and, subject to any provision which may hereafter be made by Parliament, men who have been discharged from the naval or military service of the Crown on the termination of their period of service.
6. Men who hold a certificate of exemption under this Act for the time being in force (other than a certificate of exemption from combatant duties only), or who have offered themselves for enlistment and been rejected since the fourteenth day of August, nineteen hundred and fifteen.

A protest was made against the inclusion of members of the Territorial Force who had not accepted liability for foreign service. Mr. Tennant said that the only men in the Territorial Force who would come under the bill would be those who were medically and militarily fit for foreign service, and of the vast number of men who had joined the Territorial Force at the outbreak of war, only a very small number would come in that category, for the Territorial Force had rallied splendidly to the call of the country. They would have the period up to the appointed day to take upon themselves the foreign service obligation, and the Army Council undertook that, whenever possible, a man would be posted to a unit of his own corps, unless he desired otherwise. Men who were unmarried and fit for foreign service, but declined to take that obligation, would be discharged from the Territorial Force and would come into the general pool under the bill. Later in the discussion, Mr. Bonar Law added that the Army Council would have the right to keep these men in the Territorial Force without the necessity of going before a tribunal if the Council considered they were not suited for foreign service. The proposal to exempt members of the Territorial Force not liable for foreign service was rejected by 259 to 27. Colonel Yate proposed to omit Clause 4 of the schedule, which exempted ministers of religion, but the proposal was withdrawn after an appeal from Mr. Long on the ground that there was a shortage of such ministers at home.

Medical Men.

Mr. King moved to insert in the schedule the following words: "Men who at the time of the passing of this Act were fully qualified medical practitioners, or registered dentists, or students at any hospital." Mr. Raffan, in supporting the proposal, suggested that unregistered dentists should also be included. In the discussion Mr. Glyn-Jones said that every member of a profession needed in this country would be certain to get exemption under Clause 2, Subsection (1) (*a*):

2. (1) An application may be made at any time before the appointed date to the local tribunal established under this Act by or in respect of any man for a certificate of exemption from the provisions of this Act:
(*a*) On the ground that it is expedient in the national interests that he should, instead of being employed in military service, be engaged in other works in which he is habitually engaged or in which he wishes to be engaged.

The tribunal could exempt a person on the ground that it was expedient in the national interest that instead of being employed in military service he should be engaged in other work. Knowing the needs of a district and knowing that the medical profession was short, the tribunal would decide that it was expedient in the national interest that the applicant should be permitted to continue the work of his practice. He would certainly object to the exemption of unregistered dentists. Mr. Long admitted that those engaged in the administration of the public health laws and in watching the general condition of the health of the country, and making themselves acquainted with the supply of medical men and the calls made upon them, must view the present situation with grave anxiety. Only those who were constantly face to face with the official facts realized how tremendous had been the labours thrown on medical men since the outbreak of the war, and how unselfishly and heroically they had devoted themselves to their work. He knew men working day and night, many of them for no return, many of them for very little monetary return. The matter could not be viewed without anxiety and perhaps some misgiving, but, as Mr. Glyn-Jones had pointed out, there were two methods by which those who came within the purview of the bill might be released from service—the exemptions and the exceptions. Mr. Long proceeded to argue that it would be dangerous to include in the automatic exceptions all medical men and dentists, but it was obvious that all who belonged to those professions and whose services were required should, where the interests of the country demanded it, be retained in their practices and continue to do their present work. Their case was already met.

Sir Robert Finlay, as the representative of a constituency which had a great many medical men, said that he had listened to Mr. Long's remarks with satisfaction. The shortage of medical men even at the present time was undoubtedly extremely serious, but he thought that for practical reasons the course taken by the Government was right. A medical man who was wanted would get exemption, because it would be apparent that it was inexpedient that he should be taken away to serve in the army. Mr. King offered to withdraw the proposal, but leave was refused. Mr. Raffan suggested the need for keeping constantly in view the retention of those who were engaged in work contributing to the health of the community, and Mr. Long agreed. Mr. Holt expressed the hope that the army would not take even volunteers among medical men and dentists unless they were wanted in connexion with

their own professional duties. There were only too many willing to go and fight, but they would serve their country better at home trying to cure people than by going and killing the enemy. Mr. Long said that it was his intention to make it quite clear that medical men ought not to be allowed to take unnecessary risk unless they could be spared from work which he considered equally important. For the last four or five months he had been endeavouring to impress upon the War Office that it must exercise discretion and care in the demands it made upon the medical men for the war. The proposal to insert the paragraph in the schedule excepting medical men was then negatived without a division.

Standard of Physical Fitness.

In the discussion of the fifth clause of the schedule Captain Amery said that the fluctuations in the standards of rejection for medical fitness had been wide. There was, for instance, a difference of opinion as to teeth. In one place the doctors rejected every man who had more than four teeth missing, while in another it was said that as long as a man was well nourished and had hard gums he might be passed. There were also a few cases of malingering, especially in connexion with alleged defective eyesight. Colonel Yate considered that the number of men rejected as being below the standard of height and measurement might be reduced by a little careful training and extra food. At Leicester 849 men were rejected in 1914; of these 384 had, as a result of competent instruction, been passed as fit, and 254 were still under training, so that of the original 849 only 211 were finally rejected as unfit. Mr. Long admitted that there was some difficulty about the matter. Since the war broke out the work of medical examination had been in some districts indifferently performed, whereas in others the standard set was very high; he instanced the case of one commanding officer who insisted on so high a standard that a great many men were rejected who, now that the medical examination had been more equalized, would be accepted. For this and other reasons he believed that under the existing better organized system a great deal of excellent material would be found among those who were formerly rejected. He believed that the indirect effect of the bill would be to bring in all those who wanted to come in, and as regards the small minority who had got their certificates improperly—and they were the worst kind of shirkers—if there were any other means by which they could be brought in he would not hesitate to ask Parliament to use them. After some further discussion the amendment was withdrawn.

Schools and Colleges.

Another amendment to exempt all men at a school or college, or under articles for the purpose of entrance into a profession was withdrawn, after the Home Secretary had pointed out that the proper course was to allow all such cases to be considered individually on their merits, in accordance with machinery provided by the bill, and had undertaken to introduce an amendment on the report stage. The second schedule setting up local and appeal tribunals, and a central tribunal was adopted with some verbal amendments.

The report stage of the bill was concluded on January 24th, and the bill was read a third time by 383 votes to 36.

War.

Medical Students.—Sir Gilbert Parker, on January 24th, asked what was the policy of the Government with respect to the recruiting of first and second year medical students, and instanced a case in which an applicant had been refused by an officers' training corps on the ground that he was a medical student. Mr. Tennant replied that there had been no change in the policy of recruiting first and second year students, and referred to the answer he had given to Mr. Shirley Benn on January 12th (BRITISH MEDICAL JOURNAL, January 22nd, p. 140), in which he stated that the statistics bearing upon the matter were being further examined. He added that it was not contemplated that qualified medical men should be used as soldiers in the ranks.

Physical Unfitness.—In reply to a question by Sir E. Cornwall, on January 20th, as to whether men otherwise fit for service who had been rejected on the eyesight test would be afforded another opportunity for examination, with a view to their being utilized in some branch of the service where good eyesight was not of primary importance, Mr. Tennant said that there was nothing to prevent a man who had been rejected in the past as medically unfit on any grounds from presenting himself again if he wished to do so. On the same day Mr. Thomas raised the case of men who, under the Derby recruiting scheme, had only been subjected to a cursory examination and when called up and subjected to a more searching examination were found unfit for service and sent back to civil life. This caused loss and inconvenience to men who were in the position of having to dispose of or wind up a business, or whose positions had in the meantime been refilled, and he asked that measures should be taken to enable men to be finally examined before they severed connexion with their civil occupations. Mr. Tennant promised that every effort should be made to do this.

Artificial Limbs.—On January 20th Sir George Toulmin asked whether the best available artificial limbs were being supplied to officers and men who had lost limbs, and if the whole cost was not paid by the State, what proportion was paid in the case of officers and men respectively. Mr. Tennant said that officers were given such sum as the Army Council considered sufficient to defray the necessary expense of providing the artificial appliances, and the artificial limbs for men were provided and prepared at the public cost. At the institution at Roehampton House all men who had lost limbs could have the artificial limbs fitted under the advice of expert orthopaedic surgeons and receive instruction in the use of the limbs.

Recruits' Eyesight.—Major Lane-Fox on January 19th asked a question as to the rejection of men otherwise suitable on the ground of defects of sight which could be corrected by glasses. Mr. Tennant said that the minimum standard for eyesight for general service was low, and soldiers were given glasses to bring their sight more nearly to the normal. There were, however, cases in which glasses could not bring the sight to a standard sufficient for general service. In reply to a suggestion by Major Lane-Fox, that there was a considerable amount of evasion of military service by men whose eyesight was not really seriously defective, Mr. Tennant said that instructions had for some time been in force to the effect that a mere statement of inadequacy of vision was not to be regarded as sufficient reason for excusing military service.

Insanity of Wives.—On January 20th Mr. Samuel asked a question as to the case of a soldier now serving in France whose wife had lost her reason and had to be temporarily taken to an asylum and his two children to the cottage home of the guardians. He asked whether by this not only was the soldier disfranchised, but also the army allowance for the maintenance of his wife and children stopped. Mr. Long said, in reply, that under the Electoral Disabilities (Naval and Military Service) Removal Act, 1914, the soldier would not be disfranchised on account of the circumstances mentioned, nor would the issue of an army allowance in respect of the maintenance of the children be discontinued, but, as the War Office Order stood at present, it did not refer to wives' allowances. He believed, however, that the matter was under consideration. In reply to a further question, on January 24th, Mr. Forster said that the separation allowance issued in such a case was at the higher rate given when children were motherless.

Lunacy Institutions.—In reply to Mr. Shirley Benn, Mr. Tennant stated, on January 20th, that the lunacy institutions being used in whole or in part for the accommodation of unwounded soldiers invalided through transient loss of balance or mental disorder were: Springfield War Hospital, Wandsworth; the Napsbury War Hospital, St. Albans; the Red Cross Military Hospital, Maghull, near Liverpool; and the War Hospital, Peebles, N.B. The institutions had been taken over by the War Office, and were entirely under its control.

Wastage.—Colonel M'Calmont asked, on January 24th, what proportion of the 15 per cent. calculated as the average monthly wastage for infantry of the expeditionary forces must be reckoned as permanently non-effective, and what proportion must be considered as requiring replacement by drafts from home. Mr. Tennant said that the matter could not be conveniently dealt with in an answer to a question, and he doubted whether it could be

discussed in public without giving to the enemy information better withheld.

The Statistics of Enteric Fever in the British Armies.—Mr. W. Thorne asked the Under Secretary of State for War, on January 20th, why no statistics were given of the balance of 215 cases of enteric fever over and above those diagnosed after bacteriological examination; if cases bearing the name of paratyphoid fever, trench fever, pyrexia, and other pseudonyms of enteric fever were included in the totals furnished by him; and, if not so included, would he furnish statistics of cases and deaths diagnosed under those heads, as well as those for the 215 cases of enteric fever referred to above? Mr. Tennant said: The 215 cases consisted of those waiting bacteriological examination and also of some cases which, in the early days of the war, were not bacteriologically examined, but were diagnosed as enteric fever on clinical grounds only. The diseases mentioned in the second part of the question were not included in figures I gave on January 10th. I cannot accept my hon. friend's suggestion that those diseases are pseudonyms for enteric fever. No statistics are available of the cases of trench fever and pyrexia. My hon. friend's question appears to me to suggest, though, no doubt, inadvertently, that the medical authorities hide cases of enteric fever by falsely returning them under other names. So far as this suggestion is contained in the question, I must repudiate it. I did not give particulars of the cases of paratyphoid in my answer of January 10th because no system of inoculation for that disease has been adopted.

Vaccination.—On January 25th Mr. Tennant informed Mr. King that a soldier deemed to have enlisted under the Military Service (No. 2) Bill would not be deemed to have consented to be vaccinated.

Direction of Army Medical Services.—Mr. Lynch, on January 20th, asked whether, as the Army Medical Services were subjected to dual control, one Director-General being in England and another in France, who might work contrary to the plans of the Director-General in England, and who possessed authority to upset the units of hospitals as soon as they arrived in France, appropriate steps would be taken to deal with the matter. Mr. Tennant replied that the appropriate steps for dealing with the matter would be to make no change. There was no conflict of authority. Medical units in the field were under the orders of the Commander-in-Chief to dispose of in any way that was thought fit, and he did not see how it could be otherwise.

Salaries of Director-Generals.—Mr. Lynch, on January 20th, asked what was the total of the emoluments at present being received by the Director-General in England, including present pay *plus* pension and salary as President of the Imperial College of Science and Technology; what emoluments were being received by the Director-General in France; and whether he was receiving the salary of a Director General, together with allowances, as well as a wound pension. Mr. Forster: The Director-General of Army Medical Services at the War Office is receiving from army funds £2,000 a year pay and £625 pension. He is receiving nothing from the Imperial College of Science and Technology. The Director-General of Medical Services in France is receiving £2,000 a year pay and the field allowance of his rank (£273). His wounds pension was commuted some years ago.

Remuneration of Re-employed Retired Officers, R.A.M.C.—Mr. Lynch, on January 20th, asked whether retired officers, R.A.M.C., who had been called up for active service were now receiving full pay of rank in addition to full pension, and what pay was each surgeon-general and each colonel receiving. The Financial Secretary to the War Office (Mr. Forster) said that the answer was in the affirmative except in the case of a small number of surgeon-generals who had given their services in posts of a grading not commensurate with their rank, who drew £600 a year in addition to pension.

R.A.M.C. Income Tax.—On January 25th Mr. Watt asked whether accompanying the pay of officers of the R.A.M.C. sent in December there was a notice saying that income tax would in future be deducted at the rate of 1s. 9⅜d. in the £, and whether this notice was in conflict with the Chancellor of the Exchequer's statement that these incomes would be subject only to a reduction of 1s. 6d. in the £, even though the general tax was raised to a higher level. The Financial Secretary to the Treasury said that he understood that no general notice of the nature indicated had been issued to officers of the R.A.M.C., but he pointed out that under the Finance (No. 2) Act, 1915, the proper rate of deduction from the pay of officers whose total income exceeded £300 and did not exceed £1,000 was for the year ending April 5th next 1s. 9⅜d. in the £.

Promotion in R.A.M.C. — Mr. Laurence Hardy, on January 25th, asked the Under Secretary of State for War whether temporary lieutenants of the R.A.M.C. and captains received considerably higher pay than captains, Special Reserve R.A.M.C., although in many cases the latter officers served before the war, whilst the former had no previous experience; whether there had been no promotion in the Special Reserve R.A.M.C. since the war beyond the rank of captain, though there were now in the service 543 captains of the Special Reserve as against 39 at the outbreak of war; and whether he could see his way to giving equal pay and opportunities for promotion to this branch of the R.A.M.C. as were enjoyed by the other branches of the medical services, namely, Regulars, Territorials, and temporarily enlisted. The Financial Secretary to the War Office made a written reply as follows: Captains R.A.M.C. Special Reserve receive the same pay as captains R.A.M.C. Regular Army. Their emoluments are nearly the same as those of temporary lieutenants or captains serving under civil contract. The large number of captains in the Special Reserve is due to recent promotions, and can hardly be made a reason for further promotions. The senior captain in the Special Reserve has less service than the senior captain in the Regulars. It does not appear that officers of the Special Reserve are at a disadvantage.

British Prisoners in Turkey.—Mr. Tennant, on January 24th, stated, in reply to a question by Mr. Macmaster, that the number of officers and men of the Royal Navy and the British regular, colonial, and Indian forces at present prisoners in Turkey were as follows: Officers 47, other ratings and non-commissioned officers and men, 598. Although letters from individuals not infrequently spoke of markedly good treatment, there was reason to fear that the general condition of internment in Turkey was far from satisfactory; but, owing to the remoteness of some of the camps and the difficulties of communication, it was hard to ascertain the actual state of affairs. The American Ambassador at Constantinople had done everything in his power, but had been unable to obtain the consent of the Turkish Government to visit the internment camps.

German Army Casualties.—Mr. Tennant, on January 19th, gave the following as the casualties for the whole German army, founded on the best information available, and coming down, he believed, to the end of the year:

Killed	588,986
Died	24,080
*Wounded	1,566,549
Missing and prisoners	356,153
Total	2,535,768

* This figure includes both wounded and severely wounded.

In reply to a further question, Mr. Tennant said that the information at his disposal was not by any means complete.

[The figures given by Mr. Tennant on December 21st, 1915, will be found at p. 26 of the JOURNAL of January 1st, 1916. The total then given was to November 30th, 1916, and was about 11,000 lower than in the above table. The total now returned as killed is, however, over 100,000 higher.]

Local Loans.—The President of the Local Government Board has stated that since the outbreak of the war it has sanctioned 997 loans to local authorities, amounting in the aggregate to £12,647,187. Of this amount £8,929,560 was sanctioned prior to March 26th, 1915.

THE book entitled *Makers of Man: A Study of Human Initiative*, by Dr. C. J. Whitby of Bath (Rebman, 1910), has been translated into Japanese by a society organized in Tokyo in 1908 under the auspices of Count Shigenobu Okuma, the well-known statesman and educationalist, to popularize Western information and ideas. The "Dai Nippon Bummei Kyokwai," whose objects are comparable to those of our University Extension Movement, has already issued translations of about a hundred standard works of various nationalities chosen by its committee.

THE WAR.

ARRANGEMENTS FOR CONVALESCENT OFFICERS.

(From a Correspondent in Northern France.)

THE existing arrangements for the benefit of officers convalescent from wounds received or disease contracted on active service during the war, are much the same as those which proved so useful last winter. Superficially, indeed, they are identical, except for the fact that the institution closed at Cimiez last May and reopened in November has had included in its title the name of the lady who furnishes the British Red Cross Society with the funds for its maintenance. It is known, therefore, as the Michelham Convalescent Home for British Officers. A more important difference is that the home is classed this year as a military hospital, and that consequently the regulations in regard to its administration and the admission of patients are somewhat more stringent.

The officers regarded as having the first claim on the accommodation from time to time available are those suffering from the effects of wounds or whose ill health is due to the especially trying conditions of life within the fighting zone. Other officers—namely, those serving at the bases or on the lines of communication—are also eligible for admission, but in their case the regulations seem to anticipate that before their names are submitted for the approval of the D.G.M.S. they will be sent before an ordinary medical board. Cases of a chronic kind, such as neurasthenia and phthisis, as also patients who can be classed as mental and severe surgical cases, are definitely excluded.

There is room for one hundred patients, and as vacancies occur they are usually sent down in batches. At Paris they are met by an official of the Paris branch of the British Red Cross Society, and if necessary are visited by one of its medical officers. The society also arranges to send down a nurse or orderly with any officer who is unfit to travel unassisted. The medical officer, or medical board certifying as to the nature of a case, must state the duration of stay recommended, which must not exceed thirty days. If eventually a longer period prove very desirable, responsibility for its extension rests with the medical officer in charge of the home. The patients on their discharge are sent, as a rule, to the base details dépôt of their unit, where they are re-examined by a medical board before rejoining their battalions; some, however, are allowed to take up their work forthwith if this be of an administrative order, and the commanding officer of the home considers them fit for it.

The commanding officer, who has the title of Commandant, is a Lieutenant-Colonel, R.A.M.C., and has two officers of the same corps to assist him. The matron is drawn from Queen Alexandra's Imperial Military Nursing Service, but the nurses and the rest of the personnel belong to the Red Cross.

Each officer in residence has a bedroom to himself, but meals are taken in common. The wearing of uniform is compulsory, except during the playing of games in the park attached to the hotel in which the home is situated. In order to encourage the patients to keep in the open air as much as possible, no card games are allowed to be played before 4 p.m. If, however, the weather is very inclement the commanding officer can relax this rule. There are also regulations as to the hours between which officers can absent themselves from the home, and as to the hour at which all lights must be out.

The general idea of these arrangements is to ensure maintenance of the right military tone despite the influence of past illness, of freedom from duty, of an environment not essentially dissimilar from that of a large Riviera hotel, and of the proximity of friends and relations, for arrangements have been made by which a certain number of the latter can find accommodation on low terms at hotels in Nice, and they can be invited to luncheon and tea at the home. The special value of this home, from a military point of view, is that, besides affording officers a chance of getting fit for duty earlier than would be likely to be the case if they had to recruit their strength in a less genial climate than that of the Côte d'Azur, it obviates in a great many cases the necessity of granting them sick leave. To this step there are held to be distinct military objections when war is in progress, and when the officers concerned are not suffering from wounds or sickness likely, in the ordinary course of events, to incapacitate them for an indefinite time.

A home of similar purpose, but somewhat less formally administered, has been at work at Dieppe for a good many months for officers belonging to the Canadian contingent, and one for the use of Red Cross nurses and members of Voluntary Aid Detachments employed with the army was opened in Mentone in November. There is no corresponding place for army Sisters, but, on the other hand, a rest home, at which nurses who have been ill or are more or less "run down" can obtain a change of scene and surroundings, has been at work at Hardelot for nearly a year, and I believe there is another at Rouen. The ladies to whom these homes owe their existence, and by whom they are conducted, have official sanction for their work, and they have undoubtedly been of the greatest utility.

Those specially interested in the Cimiez home will find a more detailed account of its arrangements, and some of the considerations attaching to the maintenance and management of such institutions, in the BRITISH MEDICAL JOURNAL for April 3rd, 1915. It was then known as Queen Mary's Convalescent Home for British Officers.

CASUALTIES IN THE MEDICAL SERVICES.

ARMY.

Died on Service.

THE casualty list published on January 22nd gives the name of Lieutenant J. Le K. Mavety, R.A.M.C. (temporary), as having died in France. He was attached to the Royal Field Artillery. He joined the R.A.M.C. from the Canadian Army Medical Corps in June last.

Wounded.

Captain H. S. Milne, R.A.M.C., Special Reserve, France.
Lieutenant R. E. Thomas, R.A.M.C. (temporary), France.

DEATHS AMONG SONS OF MEDICAL MEN.

Gwynne, Owen Perrott, Second Lieutenant, 92nd Punjabis, younger son of the late Charles N. Gwynne, M.D., of Sheffield, killed in Mesopotamia, January 6th to 8th, aged 25. He was born at Sheffield, educated at Loretto, and was for five years an engineering pupil with Vickers, Maxim, and Co. He then went to Ceylon as resident engineer on the Dunsinane tea gardens. When war broke out he joined the Ceylon Planters' Corps, with which he went to Egypt. He then got a commission in the 92nd Punjabis, took part in the battle of Ismailia, and accompanied his regiment to Mesopotamia. His only brother, Captain J. F. Gwynne, R.A.M.C., fell at Ypres on July 9th, 1915.

Macnaught, Frederick Clement, B.Sc.Lond., Lieutenant R.E., elder son of the late Frederick Macnaught, L.R.C.P. and S.Ire., of Walsham-le-Willows and of Bow, London, killed at Loos on September 25th. He obtained his commission on September 24th, 1914, and was attached to the 1st Field Company of the 24th Division, R.E.

Mouillot, Augustus de Thierry, Captain 51st Sikhs, only son of the late Dr. Mouillot, of Harrogate, died in Mesopotamia, on January 12th, of wounds received January 6th to 8th, aged 33. He was born on June 21st, 1882, got a commission through the militia as Second Lieutenant in the Bedford Regiment on July 4th, 1903, entered the Indian army and was posted to the 51st Sikhs on October 1st, 1906, and became Captain on April 8th, 1912. He served in the South African war, and afterwards at St. Helena, receiving the Queen's Medal with three clasps.

Wylie, Hamilton Maclaren, Second Lieutenant 1st Battalion Seaforth Highlanders, youngest son of the late Dr. James Hamilton, inspector of schools, killed in Mesopotamia on January 7th, aged 22. He was educated at Repton and at Pembroke College, Cambridge, joined the London Scottish in September, 1914, went to France with the first draft to that regiment, and got a commission in the Seaforths in August, 1915.

NOTES.

HONOURS.

ON January 21st the Admiralty published a list of honours bestowed on naval officers for services in the Persian Gulf and Mesopotamia. Among them Surgeon Dermot Loughlin, M.B., R.N., receives the Distinguished Service Cross for attending the wounded under a heavy fire at close quarters on board the *Comet* on the night of September 28th, 1915.

A list was issued at the same time of officers and men mentioned for their services with the British Naval Mission

to Serbia. Among those mentioned is temporary Surgeon E. R. A. Merewether, R.N.

The *London Gazette* of January 22nd announces the award of a large number of honours to officers and men for distinguished service, four Victoria Crosses, seven D.S.O.'s, 35 Military Crosses, and 179 Distinguished Conduct Medals. One medical officer, Captain A. Findlater, R.A.M.C.(T.F.), gets the D.S.O., and one, temporary Lieutenant J. W. Gilbert, the Military Cross.

D.S.O.

Captain Alexander Findlater, M.D., 1st London Mounted Brigade Field Ambulance, R.A.M.C.(T.F.). For conspicuous gallantry and devotion to duty on several occasions, notably on September 29th, 1915, at Chocolate Hill, Gallipoli Peninsula. He crossed over two hundred yards of open ground under very heavy shell fire to render aid to two wounded men. He saved the life of one, but the other was beyond help.

Military Cross.

Temporary Lieutenant John Wesley Gilbert, R.A.M.C. (attached 9th Brigade, R.G.A.). For conspicuous gallantry and devotion to duty near Ypres on December 29th, 1915. After three attempts he succeeded in entering a farm, which was being heavily shelled with gas and other shells, and rendered valuable help to the wounded infantry who were billeted there.

We are informed that Captain M. A. Macdonald, R.A.M.C., M.B.Glasg., has been recommended for the French Military Cross for services under fire at Gallipoli.

Captain William Albert Colhoun, of the 4th Battalion Royal Irish Fusiliers, who received the Military Cross in the list of honours gazetted on January 14th, is a fourth-year medical student of Trinity College, Dublin.

MEDICAL OFFICERS WANTED.

2nd London Sanitary Company.

Medical men required as sanitary officers, each to command a sanitary section of 25 n.c.o.'s and men; every probability of going overseas at an early date. Those engaged in public health work and possessing the D.P.H. preferred. Applications to Captain F. G. Caley, R.A.M.C.(T.), Officer Commanding, Duke of York's Head Quarters, Chelsea.

2/1st Eastern Mounted Brigade Field Ambulance.

Medical officers required for this ambulance. Pay as in regular army. Foreign service obligation necessary. Applications to the Officer Commanding, Hurst Park, London.

3/2nd East Anglian Field Ambulance.

Medical officer urgently required. Pay and allowances as in regular army, also an outfit and field kit allowance. Applications to Officer Commanding, Halton Park, Tring.

Sydney.

SOLDIERS AND ALCOHOLISM.

A MEDICAL committee was appointed some time ago to report on the health and sanitation generally of the camp at Liverpool. The committee consisted of the Principal Medical Officer of the Second Military District (Colonel Perkins); Professor Welsh, Professor of Pathology in the University of Sydney, and Drs. Paton, W. G. Armstrong, and Cleland, of the Board of Health. The report states that the conditions of camp life at Liverpool revealed certain predisposing causes of disease. Some of these, which were incidental to the training of the soldiers, included exhaustion and fatigue, associated at one time with overheating and saturation of the clothing with perspiration, and at another with cold and wet. Such conditions depressed vitality and predisposed to disease. With reasonable care, however, such depressant effects might be mitigated. Other influences, however, were at work which were much more potent in lowering the resistance to disease. The two outstanding of these influences were intoxication by alcohol and defective ventilation and overcrowding. There was evidence that alcoholism was prevalent and excessive among the recruits. If drunkenness were checked, the committee was convinced that venereal disease would be much less common, and the susceptibility to other infectious diseases would be diminished. There was no other single cause which had so profound an effect on the health and efficiency of the troops. The committee, therefore, recommended that the following regulation should be introduced to minimize the opportunities of alcoholic excess: (1) Wet canteens should be established for the sale of light ales and wines served with ice, at moderate prices. They should be under official control, and the profits might go towards improving the canteens and the camp. The site should be preferably within the camp, or, if that be not practicable, it should be close outside. At Liverpool it should be on the same side of the river as the camp. (2) The town of Liverpool and district west of the railway line should be put out of bounds in order to eliminate the public-houses and the women of ill repute. (3) All public-houses throughout the state, except authorized canteens, should be closed to soldiers in uniform after 6 p.m. (4) Shouting for soldiers in uniform should be made illegal, as it is for all persons in proclaimed munition areas in England. (5) Discrimination should be exercised in granting leave. No late leave should be given except for special purposes or to reliable men. Ordinary leave should require return to camp before dark. Drunkenness should be penalized by curtailment of leave. (6) Ladies' clubs might be formed for the purpose of entertaining men on leave, especially those from the country, in circumstances that would encourage their self-respect.

Further efforts have been made with a view to diminishing the evil effects of drink among the soldiers. The district commandant states that conferences have been held between representatives of the military authorities and the executive of the Licensed Victuallers' Association with the object of preventing the misuse of intoxicating liquors by soldiers on licensed premises. It is stated that in some places publicans have found that when they have endeavoured, in the interests of the young men concerned, to give them friendly advice as to restraint in the use of liquor, and have endeavoured to prevent them obtaining more than was good for them, some of the general public have interfered on behalf of the soldier, and resented the advice of the publican. With a view to establishing in the minds of all the fact that over-indulgence in intoxicating liquor is an offence, and that the presence of intoxicated men on licensed premises is also an offence, a notice has been posted in the bars of hotels setting out the fact that soldiers in uniform under the influence of liquor must not enter or remain upon licensed premises; and that the licensed victualler must not suffer any soldier under the influence of liquor to enter or remain upon his premises. It has been further pointed out that under the War Precautions Act persons who take part in any action calculated to be subversive of discipline, or to prejudice the good conduct of a soldier, are liable to heavy penalties.

GERMAN DRUGS.

A deputation, consisting of Mr. Bailey, President of the Australasian Pharmaceutical Conference; Mr. Buckhurst, President of the Federal Pharmaceutical Council; Mr. R. Grimwade (Felton, Grimwade, and Co.); Dr. Sidney Plowman, Lecturer on Materia Medica and Pharmacy at the College of Pharmacy; and Mr. D. Rankin, Past-President of the Pharmaceutical Society, waited on Mr. Hughes, the Prime Minister, recently and asked him to cancel the aspirin licence and prevent German trade marks being used. In reply, Mr. Hughes promised carefully to investigate the question of striking off the trade marks register all German trade names, and that the Government would do all that was possible to encourage the manufacture in Australia of raw materials for drugs that previously came from Germany. He also promised an inquiry into an allegation that German drugs were reaching Australia through neutral countries. He had no prejudice in favour of retaining the word aspirin; the whole matter was receiving attention as part of a general policy to deregister all German trade names. He thought there was no doubt, under the Enemy Trade Marks Act or the War Precautions Act, that the Commonwealth had the power to do anything within reason in the protection of the country.

During the interview it was stated that since the renewed activity of British submarines in the Baltic the price of certain drugs in Australia had gone up by leaps and bounds. Referring to this statement, Mr. Hughes said that if it were true it was a startling fact, and he did not know whether the deduction that enemy drugs were getting into Australia through neutral countries was not justified. He asked for a list of these drugs which had shown these extraordinary and significant variations in prices.

NEW PRINCIPAL MEDICAL OFFICER FOR THE NEW SOUTH WALES MILITARY DISTRICT.

Last month the Minister for Defence decided that the appointments of Principal Medical Officer in the second and third military districts were of sufficient importance during the continuance of the war to necessitate the service of an officer who could devote his whole time to the duties. Hitherto the pay for these appointments had not been commensurate with the duties and responsibilities of a capable officer so employed. The occupants of the "part-time" positions were consequently required to vacate their positions on November 30th, 1915, and applications were called from the medical profession, either with or without military experience, to fill the vacancies at £800 per annum. The selection was to be made of the most suitable applicant of the highest professional attainments, who must be a capable organizer and administrator, irrespective of rank. The appointment was to be for a period of six months on probation, to be confirmed if satisfactory for the period of the war and four months afterwards, the successful applicant to be granted the temporary rank of colonel in the Australian Army Medical Corps while holding the appointment. The applications were referred to a committee consisting of the Adjutant-General, the Director-General of Medical Services, the commandant of the district concerned, and the President of the Branch of the British Medical Association of the district concerned. This Committee submitted their recommendations to the Minister, and Lieutenant-Colonel E. S. Stokes was appointed for New South Wales.

Lieutenant-Colonel Stokes has been for the past ten years medical officer to the Water and Sewerage Board. He is 47 years of age, possesses organizing ability, and in addition has seen service in the present war. He left Sydney with the rank of Major in the First Field Ambulance, and after spending some time in Egypt joined the staff of Brigadier-General Maclagan, who was in command of the Third Brigade and detached forces. He then proceeded to Lemnos, and on April 25th landed with the 2nd Field Company of Engineers in connexion with the water supply. Shortly after landing he was appointed Deputy Assistant Director of Medical Services to the First Australian Division, under Colonel Howse, V.C., C.B., with the rank of Lieutenant-Colonel. Among other duties he had to take charge of the sanitary arrangements of the area occupied by the First Infantry Division. Subsequently he became ill, and was given leave to return to Australia. His leave had almost expired, and instead of returning to the front he has taken up the duties of his new position.

Canada.

THE CANADIAN MILITARY HOSPITAL COMMISSION.

THE Military Hospital Commission meets once a month, but subcommittees have been formed in each province, consisting of the representatives of that province on the Commission, to make arrangements for the accommodation and medical treatment of invalided members of the Canadian Expeditionary Force. It is estimated that only about 10 per cent. of the men who return to Canada require further hospital treatment on their arrival. Ample accommodation in convalescent homes has been provided throughout the country, and any invalided soldier who returns to Canada, and who has not been discharged from service, can be placed in one of them on making application to the Secretary of the Hospital Commission at Ottawa. Arrangements have been made with the Red Cross, the Daughters of the Empire, and other societies for the provision of comforts in the shape of clothing, books, and papers. Convalescent homes have been established at Sydney, St. John, Montreal, Toronto, Hamilton, London, Calgary, Victoria, among other places, and in each arrangements have been made for electrical treatment, massage, and other remedial measures in cases of atrophied limbs and stiffened joints. Soldiers suffering from tuberculosis are sent to a sanatorium, and 10 dollars a week is paid by the Government for their treatment. The men are kept in the convalescent homes as long as there is reasonable hope of improvement, but when this exists no longer they are discharged on a pension. These men have all been examined and classified in Great Britain prior to embarkation. On arrival in Canada they are sent to the clearing hospital at the port of debarkation, where they undergo a further examination, and, if necessary, they are sent to hospital or to one of the convalescent homes. If discharged, they are given a pension and three months' pay, payable in three monthly instalments. A careful record of all cases is kept, including the nature of the disability, the occupation prior to enlistment, the possible sources of income, and the nature of the occupation they would like to follow if unable to continue the work in which they were engaged before enlistment.

The provision of employment for such men has been undertaken by provincial committees, to each of which a representative of the Hospital Commission has been appointed. This branch of the work was formerly in the hands of the Patriotic Fund.

Ireland.

WORKHOUSE AMALGAMATION.

AT the last meeting of the Cork County Council, the chief business was to consider generally the question of the amalgamation of the Poor Law Unions of the county and other matters connected therewith. The following resolution was unanimously adopted:

> That having regard to (1) the great decrease in the population since the present Unions were established; (2) the fact that there is no unemployment at present existing; (3) that the sum of £190,000 approximately is paid yearly throughout the county under the Old Age Pensions Act; (4) that a sum of £15,000 approximately is paid to insured persons in the county under the National Health Insurance Act; (5) the greater possibilities afforded by railways and motor ambulances, we consider that several workhouses could with advantage be abolished, and the Unions amalgamated with adjoining Unions; and that the Local Government Board be asked to hold an inquiry at the County Courthouse, Cork, at which the guardians of the several Unions and other persons interested may be represented.

A DOCTOR'S SUPERANNUATION.

At its last weekly meeting the Enniscorthy Board of Guardians rescinded a resolution passed in November last, granting their late medical officer, Dr. Thomas J. Kelly, a superannuation allowance of £100 a year. The guardian who moved the rescinding resolution (which was carried by a vote of twenty-one to fifteen) said that when they were kind and generous enough to give Dr. Kelly £100 a year he at once wrote off to the Local Government Board, and complained that certain emoluments had not been taken into consideration. As the clerk had since informed them, the doctor's statement was incorrect. It was to punish the doctor for writing such a letter, and to show him and all officials that the dignity of the board of guardians must be respected that he moved his motion. Several proposals were then put forward as to the amount which should be granted the doctor. The sums ranged from £100 to £20. The final vote was between £75 and £50, and the latter sum was carried by twenty-two votes against fifteen.

RED CROSS FUND.

From the reports of the local committees presented to a meeting of the central committee of the Leitrim Red Cross Fund last week it appeared that, although this fund was only started in November last, the substantial sum of nearly £900 had been collected. It was decided to allocate the fund as follows: £470 for the purchase, through the War Office, of a Sunbeam motor ambulance, bearing the inscription "Presented by the County Leitrim for service with the 10th (Irish) Division of the British army in the field"; £300 to the British Red Cross Society, and the balance to the Connaught Rangers' Comforts Fund, including prisoners of war. It was decided to keep the fund open for further subscriptions until January 31st, 1916.

THE *American Journal of Orthopedic Surgery* will in future be published at Boston and will appear monthly instead of quarterly. While continuing to be the official organ of the American Orthopedic Association, its scope will be enlarged so as to appeal to surgeons and general practitioners as well as to specialists.

Correspondence.

THE SOLDIER'S HEART AND THE STRAINED HEART.

SIR,—One may well be glad and satisfied with the recent discussion anent the soldier's heart at the Royal Society of Medicine, for it gives expression to an opinion from those well qualified to give it, that "the soldier's heart" is but our old enemy "the strained heart" now come out into the open, and sailing under its true colours. It is much to be hoped that this will sink home into general practice: that the so-called "strained heart" is not a *muscular* fault, but a temporary overdraft of current account of nervous energy, and that we shall hereafter—vain hope, I fear—banish that vicious term from our nosology, shrouding as it has done, and does, so many young men and women, and even children, in its winding sheet of "dilatation of the heart" for months, nay, often for years, when they should never have been invalided in that sense at all. —I am, etc.,

London, W., Jan. 22nd. JAMES F. GOODHART.

SIR,—My remarks on the "Soldier's Heart" in the discussion on that subject (JOURNAL, January 22nd, p. 131) were quite extempore, and I had hoped that the larger question of the heart in the soldier might have been considered. Consequently your report, which is necessarily brief, makes me rather too emphatic as to the hopelessness of the future of such a condition in the soldier. Recovery depends a good deal on the man himself. The term, the "soldier's heart," like any other which may be defined, might be allowed currency, as also might that of the "soldier's brain" or the "soldier's spinal cord." But it is, I think, of questionable utility that one of many evidences of shock and exhaustion should be emphasized to the exclusion of the general state in which it is merely an incident. This tendency to the specialization of effect, in the case of an agent acting generally, is rather amusingly evident at present in that capture from secretions and excretions of organisms regarded as having a particular effect upon a given organ.

Excluding possibilities of contamination—frequently a difficult matter—by such care as the bacteriologist can exercise, what reason is there to suppose that the organism (or its assumed toxins) which he captures from the excretions or secretions are the actual cause of a local condition, the blood itself not growing any such organism, and the host showing no morbid reaction to the invasion? There is admittedly no proof, and however fruitful the suggestion may prove, it can at present be regarded as no more than a suggestion, and that unsubstantiated. As a matter of fact, the soldier's heart is but an incident in a general neurasthenia or state of exhaustion, and exemplifies the relation of the nervous system to sustained energy in the viscera.

The detachment with which some, of recent years, have been wont to regard cardiac motion, has placed rather in the background the relation of cardiac energy to the nervous system, but some modification of this attitude has been the result of a better knowledge of the relation of the excitatory structures in the heart to it.

Dr. Poynton referred to cases in which the general and particular collapse of the patient had apparently been a direct result of high explosive agency, and most of those who have had to deal with such cases, in the course of the present war, must be in a position to recall instances of this relation between apparent cause and effect. The immediate cardiac effect in such cases is probably a profound inhibition, for the patient usually gives a history of a temporary state of unconsciousness immediately consequent upon undergoing this experience.

Many, perhaps most cases, however, are the result of a general exhaustion without direct relation to high explosive agency. Indeed, the "soldier's heart" may occasionally be met with in the overworked civilian, harassed by anxiety, and, as distinguished from particular disorders of the heart induced by the life of the soldier, it is but an incident in the generally shattered nerve energy of the patient, who is, in short, a neurasthenic with exaggerated sensibility. One sees, for example, seasoned soldiers of fine physique suffering from so general an exaggeration of sensibility, as to conceal altogether the local cardiac condition, with sighing respiration and inability for exertion. In this general state, no evidence of local lesion in the nervous system may be notable, beyond the marked psychasthenia and neurasthenia of which the exaggerated sensibility is an expression. Such a condition might as well, as I have said, be termed the "soldier's brain" or "spinal cord," as the cardiac state the "soldier's heart." Nevertheless, given a definition, we recognize the condition.

The treatment, therefore, of the "soldier's heart" is the treatment of a general neurasthenia which is a grave disorder and by no means hysteria. It should consist in the first place of general and absolute rest, followed on a degree of recuperation, by gradually increasing physical exertion and mental change.

The creation or acquisition of psychical rest is the most important element in the successful treatment of such cases, for it brings with it refreshing sleep. The removal of the apprehension of breakdown may in time lead to the reconstitution of the power of endeavour—the recovery of endurance. Those who attain this, however, are usually men of some mental force, who accept their measure of disability and face its consequences with the same resolution and indifference to death, if necessary, in the discharge of their duty with which, in more perfect health, they face death in the actual shock of combat. The neurasthenic who becomes introspective and critical of his state is lost. For this reason, while in general agreement with the opener of the debate on the soldier's heart in his views of its treatment, I question whether good would result from the collection of such cases in a sanatorium specially devoted to their care. The companionship of a man who had lost his leg would be more conducive to his recovery than that of a fellow sufferer from neurasthenia with or without subjective cardiac distress.—I am, etc.,

London, W., Jan. 22nd. ALEXANDER MORISON.

SIR,—It would have been interesting and helpful had the discussion on the soldier's heart at the Royal Society of Medicine on January 18th dealt with the relation between excessive cigarette smoking and "irritable heart." Several soldiers have told me that it is quite common to smoke thirty or forty cigarettes a day, and even more than that at times. No one will deny that this is an excessive number, and that the absorption of a powerful poison like nicotine does adversely affect the heart in spite of a certain tolerance acquired by use. Excessive tobacco smoking may be a more important factor in the production of "soldier's heart" than is imagined.—I am, etc.,

Warrington, Jan. 24th. J. S. MANSON.

STRANGE WOUNDS CAUSED BY HIGH EXPLOSIVES.

SIR,—In view of Dr. J. Lewis Thomas's opinion that the strange wounds caused by high explosives are "due to the escape of internal body pressure into the vacuum produced by the explosion," the following fact which came under my own observation may prove of interest:

One night in a small town in Flanders in which I was billeted at the time several bombs were dropped. One exploded in a field, making a hole about 15 ft. in diameter. The explosion was a few yards away from the end of a barn, which was built of bricks. The curious thing about it was that this end wall instead of being blown in had fallen outwards flat, with the bricks still in position, the rest of the barn being intact. Evidently this must have been due to the vacuum caused by the explosion, and not by the explosion itself.—I am, etc.,

J. H. HOBLING, Major R.A.M.C.T.

Weston-super-Mare, Jan. 17th.

THE BACTERIA OF GANGRENOUS WOUNDS.

SIR,—Major H. R. Dean and Captain T. B. Mouat in their article on the bacteria of gangrenous wounds (BRITISH MEDICAL JOURNAL, January 15th, p. 77) refer to one type of bacillus which they isolated as *B. oedematis maligni*. Their account of this organism, however, seems to point rather to its being *B. cadaveris sporogenes* or some closely allied saprophyte. The absence of pathogenicity supports this view. There is undoubtedly a large group of bacilli,

morphologically identical, which are of faecal origin, and frequently swarm in lacerated wounds. This group is somewhat fully discussed in the late Dr. v. Hibler's monograph *Ueber die pathogen. Anaëroben.* In the autumn of 1914 I was privileged to work on this subject with Lieutenant-Colonel L. W. Harrison, D.S.O., and isolated a number of strains. Several, which were pathogenic to the guinea-pig, conformed most closely to "Art. XI" of v. Hibler, while the majority of the remainder, presenting cultural characters similar to those described by Major Dean and Captain Mouat, conformed to the account of *B. cadaveris sporogenes.* All the bacilli of this group are flagellated and actively motile (even the sporing forms) while *B. aërogenes capsulatus* is non-motile and devoid of flagella.

As I have no books with me I am unable to give more exact references.—I am, etc.,

J. F. SMITH,
Captain, R.A.M.C.(temp.)

France, Jan. 19th.

Public Health AND POOR LAW MEDICAL SERVICES.

VITAL STATISTICS IN ENGLAND AND WALES, 1915.

WE are indebted to the Registrar-General for the following statement showing the birth-rates and death-rates and the rate of infantile mortality in England and Wales and in certain parts of the country during the year 1915.

ENGLAND AND WALES.

Birth-rate, Death-rate, and Infant Mortality during the Year 1915 (Provisional Figures).

	Annual Rate per 1,000 Living.*			Deaths under One Year per 1,000 Births.
	Births.	Deaths.		
		Crude.	Standardized.†	
England and Wales...	21.9	15.1	14.8	110
96 great towns, including London	22.8	15.6	15.9	117
148 smaller towns...	21.6	14.0	14.2	114
England and Wales, less the 244 towns	20.7	14.8	13.6	98
London...	22.6	16.1	16.1	112

* Populations in the middle of 1914, estimated by the method described in the Registrar-General's Annual Report for 1907, have been used in the calculation of these rates, no reliable estimates of population in the middle of 1915 being available.

† The standardized death-rates are the rates which would have been recorded had the sex- and age constitution of the populations of the several areas been identical with that of the population of England and Wales as enumerated in 1901. A description of the method of standardizing these death-rates will be found in the Annual Report for 1911, page xxix.

POOR LAW MEDICAL OFFICERS' ASSOCIATION OF ENGLAND AND WALES.

AT a meeting of the Council of the Poor Law Medical Officers' Association on January 20th among other questions considered was that of the increased cost of drugs used in Poor Law practices. The Honorary Secretary, Dr. Major Greenwood, said that in 1864 a Committee of the House of Commons recommended that "in future cod-liver oil and other expensive medicines should be provided at the expense of the guardians," and in consequence a circular, dated April 12th, 1865, was issued by the Local Government Board ordering boards of guardians to carry out this recommendation. It was, perhaps, stretching the order too much to say that under it the guardians were compelled to pay for drugs that had become expensive medicines owing to the war, but in all equity the guardians ought to meet such increases by increasing the salary or making a special grant, and many boards had done so.

The Honorary Secretary reported that, in reply to a letter from a member, he had expressed the opinion that a joint appointment as district medical officer and workhouse medical officer at an inclusive salary was illegal. The two offices were treated in the Poor Law Orders as separate. The Council agreed, and expressed the opinion that representations should be made to the Local Government Board on the subject at the first opportunity.

With regard to the question of the federation of Poor Law sectional associations, the Council expressed the opinion that the matter ought to be deferred until after the war.

Medico-Legal.

ALLEGED IMPROPER USE OF THE TITLE OF DOCTOR.

IN the Scottish Court of Sessions an interim judgement was given on January 12th in certain proceedings which were taken by the Royal College of Physicians of Edinburgh against the Dr. Temple Company, Limited, of 7, West Register Street, Edinburgh—Harry Key (chemist), William Temple, Mathias Trudel (clerk), and John Key. The object of the proceedings, as appears from a report which was published in the *Scotsman*, is to restrain the respondents from using, in connexion with the business or businesses carried on by them at 7, West Register Street, Edinburgh, and 57, West Campbell Street, Glasgow, the name or title of "Doctor," or its contraction "Dr.," whether used in association with the names "Temple," "Temple Company," or "Temple Company, Ltd." or not; and to restrain them from pretending that they are medical practitioners or doctors, and from taking or using any title or description implying that they or any of them were persons registered under the Medical Acts or "specially qualified" to practise medicine in Scotland. In particular, the College ask that the respondents should be restrained from displaying certain advertisements upon their premises, and should be ordered to obliterate from the walls of the premises at West Register Street the name or title "Dr. Temple."

The respondents objected to the proceedings on two grounds. They said that the College were not so interested in the acts complained of as to give them in law a title to sue, and that the Medical Acts themselves provided a penal remedy which precluded civil proceedings being taken.

Lord Anderson granted the interim interdict asked for by the College, but limited its scope to Edinburgh, where alone, he considered, the College might be said to have an interest. He intimated that the point as to whether the College had in law a title to sue was one of importance and some difficulty which would be disposed of at a later stage, together with the question as to whether the acts of which the College complained constituted an infringement of the Medical Acts. The case, when finally disposed of, will raise, therefore, two points of very considerable medico-legal interest.

Universities and Colleges.

UNIVERSITY OF EDINBURGH.

UNIVERSITY COURT.

AT the meeting of the Edinburgh University Court on January 17th the Principal, Sir William Turner, expressed the gratification of the Court that two members, Lord Provost Sir Robert K. Inches and Sir George A. Berry, had received the honour of knighthood and their regret that the two new knights were unable to be present to receive in person the congratulations of their colleagues.

Students and Military Service.

On the recommendation of the Senatus, it was resolved that students who had attested and had been accepted for military service, and who had completed five terms of study of anatomy, should be permitted to appear for the professional examination in anatomy in March next.

On the recommendation of the Senatus, it was resolved that, for the present year, students who commenced medical study in winter, and who are in their third year, should be allowed to appear for examination in March next, instead of in the following July.

Prize for Women Students.

It was announced that the sum of £237 had been received from the Scottish Association for the Medical Education of Women for the purpose of founding a prize for women medical students. The precise conditions of award will be announced later.

Examiners.

The following additional examiners were appointed:—*Public Health Laboratory Work:* G. P. Yule, M.D., B.Sc., M.O.H. Fifeshire. *Pathology:* Professor H. R. Dean (Manchester). *Forensic Medicine:* W. G. Aitchison Robertson, M.D., F.R.C.P.Edin. *Public Health, etc.:* Charles Porter, M.D., B.Sc., M.O.H. Marylebone. *Midwifery:* G. Barbour Simpson, M.D., F.R.C.P.Edin.

UNIVERSITY OF ST. ANDREWS.

UNIVERSITY COURT.

AT a meeting on January 22nd it was reported that the total number of students was 350; 144 men, a decrease of 88, and 206 women, an increase of 22. A number of men students of the Martinmas term had obtained commissions, and a large number were attested or awaiting commissions, so that it was expected that before the end of Candlemas term there would be

a reduction of about 100 in men students owing to military and kindred services, without reckoning those occupied in war work in the laboratories.

The Court concurred with the Edinburgh Court in appointing Professor Sir J. Halliday Croom to be a member of the Central Midwives Board for Scotland.

CONJOINT BOARD IN SCOTLAND.

THE following candidates have been approved at the examinations indicated:

FIRST EXAMINATION.—Alice Fung-a-Ling, A. F. Caddell, G. ap Vychan Jones, W. Gibb, D. Gilmour. *In Physics:* M. J. Quinlivan, Lizzie B. Clark, N. H. Mackay. *In Biology:* M. J. Quinlivan, R. B. Forgan, W. H. Kerr, M. H. Carleton.

SECOND EXAMINATION.—Eliza Jean Stuart, T. T. Read, C. T. Gasking, A. F. Brigmen, W. B. Watson, P. M. Fernando, G. P. de Silva. *In Anatomy:* A. B. Macdonald. *In Physiology:* J. K. Steel, D. Mackay, L. H. Peries, D. Levenstein.

THIRD EXAMINATION.—S. C. Swinburne, J. H. Brown, R. McLaren, W. B Lawson, R. G. Battersby, B. Ajaji-Young, T. Jackson. *In Pathology:* E. G. Jones. *In Materia Medica:* A. B. Black, C. B. C. Moon, M. Talaat.

FINAL EXAMINATION.—T. C. MacGowan, C. A. Slaughter, T. C. van Derzeil, A. W. McGregor, C. K. Carroll, G. L. Pillans, W. L. Paterson, D. S. Taylor, D. S. Luther, D. S Graham. *Medicine:* T. Jackson, J. Bygott. *Surgery:* R. C. W. Spence, B. C. Haller, J. E. Kitchen. *Midwifery:* A. Smith, junr., J. Ross. *Medical Jurisprudence:* H. Ellison, J. W. Gordon, S. W. Hoyland, T. Hardie, J. S. Durwafl, A. Morrison, J. V. R. Rohan, G. L. Stanley, J. Y. McLean, E. M. L. Morgan, R. J. T. Malcolm Gasper, W. B. Lawson, J. G. McK. Macaulay.

SOCIETY OF APOTHECARIES OF LONDON.

THE following candidates have been approved in the subjects indicated:

Surgery—*H. H. Bailey, *†D. M. Hunt, †L. Kahan, *†G. L. T. Lawlor, †I. H. Lloyd, *†T. C. Russell, *†A. J. A. Wilson.

Medicine.—*†P. H. G. Bayon, *†C. B. de Forest, *†T. Y. Dent, *†J. Fox-Russell, †G. L. T. Lawlor, *†J. G. T. Thomas.

Forensic Medicine.—G. S. Ashby, P. H. G. Bayon, C. B. de Forest, H. M. Gray, L. Kahan.

Midwifery.—C. B. de Forest, H. M. Hobson, R. F. Jarrett, E. O. Morrison, R. H. Pettersson, J. Remers, H. N. D. Richards, C. Segal, L. Zarchi.

* Section I. † Section II.

The diploma of the society has been granted to the following candidates: C. B. de Forest, D. M. Hunt, G. L. T. Lawlor, I. H. Lloyd, T. C. Russell, J. G. T. Thomas, and A. J. A. Wilson.

Obituary.

DR. SAMUEL WHITE DUCKWORTH WILLIAMS, who died recently at the age of 75, was little known to the present generation, but the fruits of his work remain. He was the son of Dr. William White Williams, medical superintendent of the Gloucester County Asylum, who, with Dr. Conolly, was the pioneer of the present humane system of the treatment of the insane. Later these two were connected in this great work of reform with Sir Charles Bucknell and Dr. Hack Tuke. Dr. S. W. D. Williams was a student at St. Bartholomew's and matriculated at the London University. Owing to his father's illness he was unable to complete his course there, and ultimately took the degree of M.D. at St. Andrews. After assisting his father at Gloucester for a year, he was appointed assistant physician at St. Andrew's Hospital, Northampton, where he carried on his father's great work of reform and instituted the system of taking mental patients to the seaside for change of air and scene. Afterwards he was appointed assistant physician under Dr. Lockhart Robertson to the Sussex County Asylum at Hayward's Heath, and in a few years succeeded him and was head of that great institution till 1888. It was largely due to his methods and skilful organization that that asylum became such a well known model of excellence and efficiency. Dr. Thomas Bodley Scott, to whom we are indebted for these notes, adds:

His writings were not many, but were of deep interest and always well thought out. His first publication, in 1866, was on the sedative action of digitalis in acute mania. The dose used is rather startling to the less courageous minds of to-day—"drachm doses of the tincture every two hours" till the attack was passed, but in such cases nothing but heroic treatment is of avail. His most important contribution was about the same period, and was the first systematic exhibition of bromide in epilepsy. This was begun at Northampton in 1864, and his statistics of successes and failures formed the groundwork of our present treatment of this disease. His investigations were always thorough, scientific, and unbiassed by undue enthusiasm. In addition to all the anxious and arduous work that the management of a big asylum involved, Dr. Williams found time for many other interests. He was a prominent Mason in Sussex. He was a crack shot, a safe golfer, a good fisherman, and a good mountaineer; but perhaps the chief joy of his life was music, which he understood thoroughly. In his later failing years at Bournemouth his chief pleasure was in Dan Godfrey's wonderful orchestra. Here, with the full score of the chief symphonies before him, he forgot his physical troubles. He was a member of the Athenaeum Club for thirty years.

Though a very reticent and retiring man he was full of kindness, sympathy, and charity, and his friends all feel that by his death they have lost a most accomplished, courteous, learned physician and gentleman.

ON January 19th Mr. EDGAR HOWARD LAKE, B.Sc.Lond., demonstrator of anatomy at the Middlesex Hospital, lost his life as the result of a bicycle accident when he was on his way to the College of Surgeons, where he was going to present himself for his final examination. He was a man of high scientific attainments and devoted to his work. His ambition was to enter the Royal Army Medical Corps. By his premature death a man of great promise has been lost to the medical profession.

GEORGE MACDONALD, L.R.C.P. and S.Edin., who died suddenly (from angina pectoris) at his residence, 49, Murrayfield Gardens, Edinburgh, on January 14th, was for many years in practice at Markinch, Fife. He obtained his qualification of the two Edinburgh colleges in 1864, and was made L.M.Univ.Edin. in the same year. A few years ago he retired from active work and went to reside in Edinburgh. He had always taken a great interest in church matters, and soon after settling in Edinburgh he was elected an elder in St. George's U.F. Church. He was a good type of the quiet, hard-working country doctor, highly esteemed and greatly beloved. He is survived by a widow and a daughter. The funeral took place at Markinch on January 18th.

DR. JOHN LAING BRAY, who died in London, Ontario, on November 30th, 1915, was born in Kingston in 1841. He entered Queen's University as a student of medicine, and graduated in 1863. Afterwards he spent six months in Richmond, Virginia, where he served as surgeon in the Southern army during the American Civil War. In 1865 he went into practice at Chatham, where he remained until 1907, when he became registrar of the Ontario College of Physicians and Surgeons, a position he held until June, 1914, when he was obliged to resign on account of failing health. Dr. Bray was a member of the Ontario Medical Council from 1880 to 1907, in 1881 he was vice-president, and in the following year president. In 1891 he was elected to the presidency of the Canadian Medical Association. Dr. Bray always showed a great interest in the work of the profession, and as registrar of the Ontario Medical Council was well known and highly esteemed throughout the province.

DR. MALACHIA, of Milan, who recently died at the age of 80, was a gynaecologist of repute, but was best known as an advocate of social reform. He organized the first Italian congress of industrial hygiene and took a prominent part in the campaign against alcoholism and in the furtherance of cremation. In 1859 and 1860, and again in 1866, he served with Garibaldi and was awarded the silver medal for valour and the military cross of Savoy. He was a member of the Chamber of Deputies in three parliaments. Ten years ago he was made a Senator of Italy.

MR. J. G. GEORGE died at Buff Bay, Jamaica, on November 16th, 1915, at the early age of 38. He was the eldest son of Mr. Arthur George, of Kingston. When a student in Edinburgh during the South African war he joined the Royal Army Medical Corps and received the South African medal. He obtained the diplomas of L.R.C.P. and S.Edin., and L.F.P.S.Glasg., and in December, 1904, entered the medical service of Jamaica; he served for a time as one of the medical officers of the lunatic asylum, and was afterwards stationed at Buff Bay.

LIEUTENANT-COLONEL THOMAS MICHAEL O'BRIEN, R.A.M.C.(retired), died at Exeter on January 20th, aged 81. He took the diploma of L.R.C.S.I. in 1856, sixty years ago, and entered the army as assistant surgeon on January 22nd, 1858, becoming surgeon in 1870, and surgeon-major on March 1st, 1873. He retired on January 9th, 1889. The *Army List* assigns him no war service.

LIEUTENANT-COLONEL ALFRED JAMES O'HARA, Madras Medical Service (retired), died in London in December, aged 61. He was educated at the Bishop Cotton School at Bangalore, and at the Madras Medical College, where he took the L.M.S. He took the diplomas of L.R.C.S. and L.R.C.P. at Edinburgh in 1879, and entered the I.M.S. as surgeon on April 2nd, 1881; he became surgeon-major on April 2nd, 1893, and lieutenant-colonel on April 2nd, 1901, and retired on November 2nd, 1902. He served in Burma in 1886–88, taking part in the operations round Nyingyan and in those of the 3rd Brigade, and received the medal with a clasp.

LIEUTENANT-COLONEL WILLIAM MOYLE O'CONNOR, R.A.M.C.(T.F.), died in London on January 21st. He was a son of the late Mr. Patrick O'Connor, of Dublin. He was educated at University College and King's College, London, and at Trinity College, Dublin, where he became B.A. in 1886, M.B. and B.Ch. in 1887, and M.A. and M.D. in 1897. He also took the D.P.H. of the Irish Colleges, with honours, in 1889. He was for a time resident surgical assistant in the Meath Hospital, Dublin. He served for many years in the militia, and held the honorary rank of major in the army from April 1st, 1903. He became lieutenant-colonel commanding the 6th London Field Ambulance on March 31st, 1913, and was also in command of the Duke of York's head quarters school of instruction, and a member of the London Territorial Force Association. He was lecturer and examiner to the St. John Ambulance Association, medical officer of the Actors' Association, a Fellow of the Royal Society of Medicine, and a member of the British Medical Association. The interment took place at Glasnevin Cemetery, Dublin, on January 24th.

DEATHS IN THE PROFESSION ABROAD. — Among the members of the medical profession in foreign countries who have recently died are Dr. Borger, Sub-Director of the Pasteur Institute of Batavia, as the result of accidental inoculation in the course of experimental work on the prevention of plague; Dr. F. G. Byles, professor of hygiene in the University of Colorado, aged 62; Professor Andrea Ceccherelli, chief of the Institute of Clinical Surgery of the University of Parma, and director of the territorial Red Cross Hospital in that city; Dr. Edmond Chapuis, representative of the Jura department in the French Chamber of Deputies; Dr. Benjamin Joy Jeffries, of Boston, formerly ophthalmologist to the Massachusetts Charitable Eye and Ear State Hospital, aged 82; Dr. W. L. Ballenger, professor of laryngology, rhinology, and otology in the College of Physicians and Surgeons, Chicago, aged 54; Dr. C. L. Barrows, head of the gynaecological department in Cornell University, aged 58; Dr. Joseph J. O'Connell, health officer of the Port of New York, and lecturer on hygiene in the university of that city, aged 49; Dr. Rodolphe Engell, sometime professor in the Medical Faculty of Montpellier, professor of chemistry at the École Centrale, aged 66; Dr. Hamelin, honorary professor in the Medical Faculty of Montpellier, aged 75; Dr. Peter Herescu, professor of urinary diseases in the University of Bucharest, aged 47; Dr. G. T. Jackson, professor of dermatology in the Women's Medical College, New York, author of several works dealing with matters connected with his speciality, aged 63; Dr. H. L. E. Johnson, professor of gynaecology in the George Washington University, Washington, and consulting gynaecologist to Providence Hospital and the United States Government Hospital for the Insane, representative of the Department of State at the International Congress of Hygiene held at Berlin in 1907, and at Budapest in 1909, aged 57; Dr. Maurice Langier, a former president of the French Society of Forensic Medicine; and Dr. J. G. Linthicum, sometime professor of the practice of medicine in the University of Baltimore, aged 81.

Medical News.

OWING to the death of the publisher, Signor Enrico Detken of Naples, the *Giornale Internazionale delle Scienze Mediche* has ceased to appear.

THE annual meeting of the Medical Sickness, Annuity, and Life Assurance Society will be held at the offices of the society, 300, High Holborn, W.C., on Tuesday, March 28th, at 4.30 p.m.

DR. JOHN CRUICKSHANK, Pathologist to the Crichton Royal Institution, Dumfries, and late assistant to the Professor of Pathology in the University of Glasgow, has been awarded the Foulis Memorial Scholarship by that university for distinction in original work in pathology.

SIGNOR SALANDRA, the Prime Minister of Italy, has, with the object of preventing waste of effort in the provision of aid and opportunities of re-education for the wounded, set up a committee comprising representatives of the services of public health and of the army and navy to study the best means of co-ordinating the work of public associations, institutes, and other public bodies for that purpose.

AT the annual meeting of the Liverpool Medical Institution on January 20th, Dr. C. J. Macalister was elected president, Dr. Llewellyn Morgan treasurer, Dr. Hubert Armstrong general secretary, Drs. John Hay and John Owen secretaries of ordinary meetings, Drs. Frank Barendt and J. Martin Beattie secretaries of pathological meetings, and Dr. R. W. MacKenna librarian and editor of the *Journal*.

AT the beginning of December the Italian Red Cross had established 31 hospitals at the front and 150 territorial hospitals, with 16,000 beds. It had mobilized 100 motor ambulances and 22 hospital trains. Besides these, it had at its disposal about a thousand automobiles, many of which were offered gratuitously for the work. The number of doctors was 1,500 and of nurses 2,000. The total personnel of the various services was 8,000.

THE American College of Surgeons, which has now about 3,400 Fellows in the United States and Canada, has recently announced that it has obtained from them an endowment fund of £100,000. The fund is to be held in perpetuity and the income only to be used to advance the purposes of the college. These are directly concerned with matters of character and training, with the betterment of hospitals, and of the teaching facilities of medical schools, and with laws relating to medical practice and privilege.

THE Central Midwives Board held its monthly meeting on January 20th, when Sir Francis Champneys presided. It declined to accede to requests of Queen Charlotte's and the City of London Lying-in Hospitals for the postponement of the operation of the new rules of training until January, 1917. In reply to a letter the Board resolved to ask the Essex County Council to reconsider a proposal to delegate its powers and duties under the Midwives Act, 1902. The names of eleven women were removed from the roll at their own request. A penal cases meeting was held on January 21st, when Sir Francis Champneys again presided. Eight cases were on the agenda, and four of the women were charged with not being of sober habits. Seven out of the number were struck off the roll, and in the eighth case judgement was postponed for reports from the local supervising authorities in three and six months.

THE Right Hon. Henry Hobhouse has been appointed Chairman of the Departmental Committee of the Board of Agriculture on the settlement and employment on the land of discharged soldiers and sailors, in the place of Sir Harry Verney, Bt., M.P., who has received a commission in the army. Mr. H. L. French, of the Board of Agriculture, has been appointed secretary of the Committee. Sir Rider Haggard is about to start, as representative of the Royal Colonial Institute, on a mission to the Dominions for the settlement of ex-service men from the United Kingdom on the land overseas at the conclusion of the war.

IN a German work, an English translation of which has been published recently under the title *Emergencies in Medical Practice*, the author, one Dr. Richard Lenzmann of Duisberg, with a truly prophetic instinct, devotes a chapter to "Poisoning by irrespirable gases," in which he deals at some length with those that "distribute a peculiar odour," to quote the translator's curiously un-English words. Into this group would of course fall chlorine, bromine, ammonia, and other asphyxiating and lacrymogenic gases on which German scientists are entitled to

speak with the authority begotten of close study and accurate knowledge, inasmuch as the manufacturers of these gases for use in warfare never supposed that they would have to defend themselves against the consequences of their inhalation, an assumption which has not been borne out by events. It was certainly thoughtful on the author's part to discuss at length the question of treatment. No information, however, is vouchsafed as to the means of guarding against the effects of irritating gases, and the suggestions for treatment, even of such comparatively mild gases as carbonic oxide, coal gas, and sulphuretted hydrogen, are by no means up to date. Possibly the manuscript was censored in intelligent anticipation of coming events, otherwise it is difficult to account for the author's omission in this respect.

IN the nineteenth annual report (for 1914) recently issued of the National Association for the Feeble-minded (Denison House, Vauxhall Bridge Road, S.W.) it is stated that the war has interfered with the establishment of institutions which the Mental Deficiency Act made it the duty of local authorities to supply, and that consequently accommodation furnished by existing voluntary homes was taxed to the full. The Princess Christian's Farm Colony at Hildenborough had provided an additional farm house designed "for boys of a slightly better social class." The older buildings urgently needed certain additions in the way of day-space, and in order to provide this an appeal is made for £500, failing which the alternative facing the Committee would be to discharge some twenty of the existing inmates. Several additional homes (notably those established by the Rev. H. N. Burden and his Incorporated Society and the Co-operative Sanatoriums at Billericay) have entered into federation with the National Association, and steps were taken to promote closer unity amongst federated homes for mutual help, counsel, and guidance. Two conferences with this object had been held, and the opinion was strongly expressed that in addition to large public institutions under the Act the continued existence of smaller voluntary homes was most desirable. During the year communications had been addressed to the managers of rescue homes with reference to the distinctive classification of feeble-minded inmates, and the prevalent absence of such classification had been brought under the notice of the Board of Control. The report states that 673 applications had been dealt with in the twelve months preceding its issue. Notes are also given concerning some of the homes in connexion with the association, the complete list of which shows aggregate accommodation for over 2,000 inmates in 25 voluntary establishments, either "certified" or "approved" under the Mental Deficiency Act.

THE Central Association for the Care of the Mentally Defective (30 and 31, Queen Anne's Chambers, Tothill Street, S.W.) originated at a meeting called by the National Association for the Feeble-minded in November, 1913, when it was resolved to form a "central organizing body representing the statutory authorities concerned in the care of defectives and the voluntary institutions, homes, and societies dealing with defectives, both directly and incidentally, in the course of their social work." It was subsequently incorporated under the Companies Act, and among the objects set forth in the memorandum of association are the promotion of suitable treatment of mental defectives in England and Wales, the rendering of assistance (when requested) to public authorities in carrying out the Acts relating to defectives, and the formation of local branches in the various statutory areas. It is designed also to serve as a means of communication between local voluntary organizations and Government departments and local authorities. It will seek to organize the training of teachers, visitors, guardians, attendants, and others concerned in the care of defectives, to give assistance in the case of individual defectives not under statutory authorities, and to keep records of such defectives and of societies and institutions dealing with defectives. From the first report of the council (which deals with the period to July 22nd, 1915) it appears that considerable progress has been made in carrying out these objects in spite of difficulties caused by the war; twenty-five local voluntary associations have been formed, a scheme of training for special teachers has been drawn up and submitted to the Board of Education, and a course of instruction for visitors and officials established. The Board of Control has recognized the practical work done by the association and shown its confidence therein by financial grants under Section 43 of the Mental Deficiency Act to the amount of £300. The report closes with an interesting account of the summer school for teachers of mentally defective children held under the auspices of the association in July last.

Letters, Notes, and Answers.

THE telegraphic addresses of the BRITISH MEDICAL ASSOCIATION and JOURNAL are: (1) EDITOR of the BRITISH MEDICAL JOURNAL, *Attiology, Westrand, London*; telephone, 2631, Gerrard. (2) FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London*; telephone, 2630, Gerrard. (3) MEDICAL SECRETARY, *Medisecra, Westrand, London*; telephone, 2634, Gerrard. The address of the Irish office of the British Medical Association is 16, South Frederick Street, Dublin.

LETTERS, NOTES, ETC.

EPILEPSY.

DR. A. G. CRIBB (G.M.O., Millthorpe, N.S.W.) writes: Some years ago one of my patients, a rheumatic subject, who used methyl-salicylate ointment frequently for lumbago, told me that it acted like a charm when rubbed into his chilblains. I followed this clue, and have long ago come to the conclusion that chilblains in the majority of cases are due to uric acid, and I treat the patients accordingly. A purin-free diet, a mixture of sodium salicylate and potassium bicarbonate with cascara, and the methyl-salicylate ointment rubbed well in night and morning, will quickly relieve the patient. In the JOURNAL of October 23rd, 1915, Dr. Mercier discusses the value and necessity of bromides in epilepsy. The late Sir William Gowers introduced borax in this disease, and I always combine it with the bromides. I am of opinion that a purin-free diet with a rural life is of more importance than the administration of drugs.

WHOOPING-COUGH AND KINKHOST.

WITH reference to a note under this heading which appeared in the JOURNAL of January 8th, p. 76, Dr. J. A. Nixon, of Clifton, refers to Hecker's *Epidemics* (Sydenham Society, 1844, p. 219) for an account of the origin of the term "Coqueluche" as applied to whooping-cough. Hecker adds little to the authorities quoted in the note. In an account of epidemics of influenza he says: "The French, who, from the levity of their character [Hecker was, of course, a German], have always called serious things by jocose names, designate this disease *Coqueluche* (the monk's hood), because, owing to the extreme sensibility of the skin to cold and currents of air, this kind of hood was generally necessary, and was a protection against an attack of the malady as well as against its increase." The term was first employed during a severe epidemic in Paris in 1414 in which all who had the complaint suffered from hoarseness, and all public business was interrupted. This is the epidemic of which Mézeray speaks in his *Abrégé chronologique de l'histoire de France* (Paris, 1690), where he says: "Un étrange rhume qu'on nomma coqueluche, lequel tourmenta toute sorte de personnes, et leur rendit la voix si enrouée que le barreau et les collèges en furent muets." The word *coqueluche* was afterwards applied to whooping-cough. To Hecker's reference we may add the following: Kurt Sprengel in his history of medicine (French translation by A. J. L. Jourdan, second edition, Paris, MDCCCXV, t. iii, p. 85) says *coqueluche* was by some connected with *cucullus*, a hood, while others derived it from *coquelicot*, the wild poppy, because the syrup of that plant was first used in the treatment of the disease. Skeat may also be quoted (*Etymological Dictionary, sub voce*): "Chincough, the whooping-cough. (E). 'No, it shall ne'er be said in our country Thou dy'dst o' the *chin-cough*' (Beaum. and Fletcher; Bonduca, 1, 2). It stands for *chink cough*; prov. Eng. and Scot. *Kink-cough* or *kink-host* where *host* means 'a cough.' Cf. Scot. *Kink*, to labour for breath in a severe fit of coughing (Jamieson). It is an English word, as shown by '*cincung*, cachinnatio' in a glossary, printed in Wright's Vocab., 1, 50, col. 2; which shows that *kink* was also used of a loud fit of laughter. *Kink* is a nasalized form of a root *Kik*, signifying 'to choke,' or 'to gasp'; an imitative word like Cackle, . . .+Du. *Kinkhoest*, the chincough, whooping-cough; O.Du. *Kiechhoest*, *Kichhoest*, the same (Kilian). + Swed. *Kikhosta*, the chincough; *Kik-na*, to gasp, to pant (where the *n* is formative, to give the word a passive sense, the lit. meaning being 'to become choked').+Dan. *Kighoste*, the whooping-cough.+G. *Keichen*, to pant, gasp. B. A stronger form of this root KIK, to gasp, appears in the English *choke*. . . . Indeed, the word *cough* is also related to it."

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